THE
ELECTRICAL REVIEW

Volume CXXVII. No. 3269

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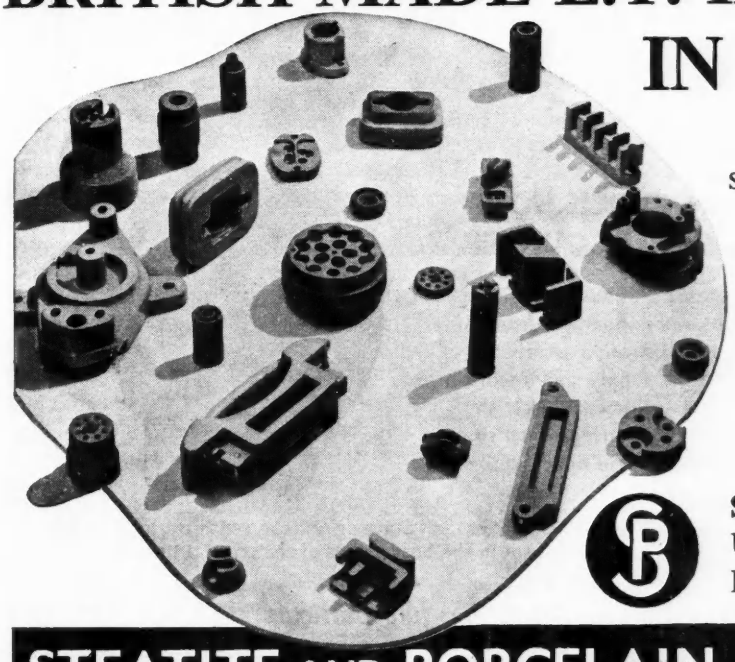

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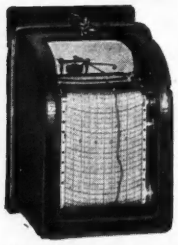

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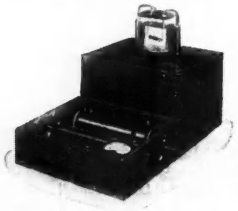

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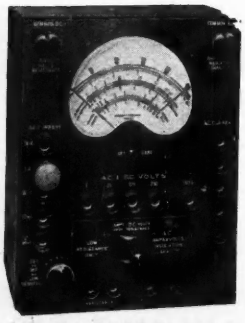

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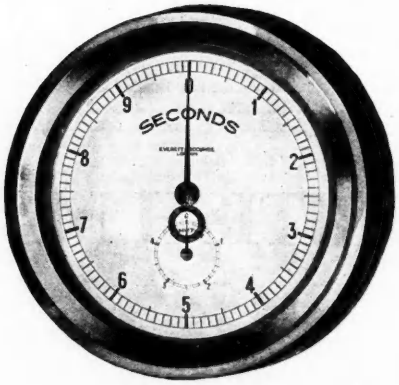

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THE
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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVII. No. 3269 JULY 19, 1940 Price SIXPENCE

Switching Voltage

Benefits from Higher Values in Generating Stations

ADDITIONAL force is given by war conditions to the case for the adoption of a higher voltage when there is any doubt at all on the subject. The maxim that the cost per kVA of insulation is less than that of conductors is reinforced by the consideration that metals will for a long time be much more difficult to obtain. Moreover, conductors remain conductors, whereas insulation (including its physical dimensions) is continually being improved as a result of research.

One aspect of this question was referred to during the I.E.E. discussion at Newcastle-on-Tyne on Mr. W. D. Horsley's paper on high-voltage alternators. Although a side issue of the main theme, it is none the less important since it emphasises a way of regarding methods of switching in generating stations that is likely to influence practice to an increasing extent.

Bad Economics

The principle involved, as expressed by Mr. F. C. Winfield, is that the association of generation switching with major distribution systems as distinct from transmission systems is bad economics. In supporting this view from the engineering angle, Mr. R. W. Gregory submitted that switching should be carried out at transmission voltage and that lower voltages for distribution should be obtained by stepping down where required. The principle involved does not depend on 33-kV generation, although this has certain inherent advantages, and holds good if the alternator is solidly connected as one unit with a step-up transformer.

This point of view differs fundamentally from the traditional idea that the generation switching voltage should be that of the primary distribution system when the local load forms a major proportion of the whole, and that if any smaller proportion of the output, e.g. for giving a bulk supply, has to be transmitted for an appreciable distance, the voltage should be transformed up for that purpose.

As long as loads and short-circuit kVA were relatively small that method was satisfactory enough. When it is sought to perpetuate it in modern conditions, however, its weak point becomes apparent. It fails to take account of the economic bounds set to switchgear design by the relationship between normal current, system voltage and short-circuit kVA, a relationship which Mr. A. J. Nicholas recently discussed in a paper which he read before the E.P.E.A. at Manchester.

Since electromagnetic forces on short-circuit limit breaking current to 44,000 A (with 110,000 A as the making peak), having regard to the need to keep size and cost of breakers within reasonable compass, the maximum rupturing capacity at 6.6 kV permitted as a standard is 500 MVA. This is not so much as the amount available from a couple of standard 37,500-kVA alternators, apart from interconnection with other stations. The maximum normal current rating of the largest 6.6-kV circuit-breaker listed in B.S.S.116, namely 2,000 A, would be far below that of a machine of this output. At 11 kV, the position is better, but still leaves too little in hand. A 3,000-A 750-MVA breaker at that voltage is included in the B.S. range, but presumably only because existing installations have to be taken into account. Even heavier models have been built, but they should not be called for.

Scope of 33-kV Gear

The largest size of 33-kV B.S. switch is rated at 1,200 A and it is of a reasonable size. Many engineers consider this to be about as much as should be controlled from one panel at any voltage. It can be built with rupturing capacities up to 1,500 MVA, which meets modern requirements. There are more than thirty stations feeding large local networks where the possible short-circuit kVA (from plant installed alone) exceeds 750 MVA and a number of others are within measurable distance of this figure. Examples of transmission-voltage switching at stations situated in load areas are provided by Battersea, Dunston and Fulham, at each of which 66 kV has been adopted.

Further advantages of high-voltage switching are that fewer circuit breakers are required (these operating under better conditions, i.e. with smaller fault currents) and that fewer cables or lines leave the station, thus materially reducing the often serious difficulty of finding suitable routes. Again, the lowering of the rupturing duty of distribution switchgear owing to the additional reactance between it and the generating stations is an asset in stabilising ratings when generating capacity is being enlarged.

The above considerations lead to the conclusion

that primary switching at new stations and for new plant at extended stations should be carried out at not less than 33 kV. In other words, growth of load is better dealt with by higher grade insulation than by heavier conductors for technical reasons as well as on grounds of national interest.

Compulsory Registration

BEFORE the activities of engineers can be efficiently directed into the most productive channels, in the war sense, full particulars of the qualifications of all of them should be available. Five weeks ago we referred to the request of the Minister of Labour and National Service that those professional engineers whose names were not entered in the voluntary registers of the I.E.E. and other major institutions or directly at the Ministry should take appropriate steps forthwith. The Order made last Sunday requiring, under penalty, all those coming within this category to apply to the Ministry in writing before to-morrow for enrolment forms, does not necessarily imply that men will be required to change their positions. It does mean, however, that where a war-created scarcity exists the authorities will be able to decide how the space can best be filled. So many electrical engineers have been engaged on or reserved for work of national importance that the need to register has not always been apparent. Moreover, the response would no doubt have been more prompt but for the widely expressed disappointment at the little use made officially of the proffered services of those who had registered. With the completion of the records it is to be hoped that such anomalies will speedily be put right.

Aluminium

AMONG the least practicable of the suggestions made for securing additional aluminium for aircraft production is one put forward by a "civil engineer" in *The Times*. His idea is that "electrically equivalent" steel should be substituted for aluminium conductors in overhead lines. Some 12,000 tons might, perhaps, be made available in this way, mainly by stripping the grid. Unfortunately, steel is also somewhat scarce, and to support six times the weight of metal (allowing for s.c.a.) reconstruction of a number of towers would be required. That takes into account only ohmic resistance, and we leave it to the mathematically minded to calculate the effects of reactance at 132-kV spacing and to estimate the number of man-hours of skilled labour that would be involved in the change-over. No regard need be paid to corona, however, since the diameter of steel conductors would be over one inch and would be greater still if hollow tubes were used to minimise skin effect!

Buenos Aires Transport

THE unsatisfactory passenger transport arrangements in Buenos Aires were severely criticised recently by the *Review of the River Plate*. Reference was made to the "fleet of dilapidated and antiquated omnibuses, and a tramway service, the irregularity of whose running is only comparable in deficiency with the condition of many of the vehicles themselves." To remedy this state of affairs our contemporary advocates the immediate provision of trolley-buses which, it says, possess many advantages over their rivals. Attention is also drawn to the pre-eminent position held by the British trolley-bus, and it is considered that, in spite of wartime difficulties, some part of Argentina's "frozen" sterling funds should be devoted to the purchase of these badly needed vehicles.

Electrical Buoyancy

DURING the first weeks of the war the majority of electricity undertakings suffered a considerable loss in sales and the prospects for the future—at least for the duration of the war and very likely for some time afterwards—were by no means bright. In the reports of a number of supply companies, covering a period which included four war months, it was recorded that eight months of active development were largely negatived by the results of wartime restrictions. Reports of municipal undertakings which are now appearing, and extend over seven war months, are more encouraging, telling of a substantial revival following the earlier setback. The general view seems to be that the position is not nearly so bad as was at first feared. Naturally, the growth of the industrial load has been the most important influence, and primarily residential districts have not fared so well, but except in evacuation areas the domestic load has in many cases continued to grow despite the present obstacles.

Capital Expenditure and Prices

SHORT of renewed rationing or crippling increases in charges it appears unlikely that the domestic consumer will forsake electrical methods after having experienced their advantages. The importance of keeping down charges is pointed to by Sir Percival Bower, and as a cover for any future emergency the Birmingham Electric Supply Committee is carrying forward a surplus of over £200,000. Other local authorities, less wisely, are raiding the profits of their undertakings for rate relief, with the result that higher charges are inevitable. Another danger is drawn attention to by Mr. J. E. Shepherd, of Barrow-in-Furness. He points out that owing to Treasury restrictions there is the temptation to increase prices so as to make a large surplus in order that works of a capital nature may be paid for out of revenue. No doubt this is legitimate, but if it means increased prices it is likely to lead to a restriction of consumption which will defeat the purpose of the expenditure.

E.D.A. Carries On

WITHIN the limits imposed by wartime conditions and a smaller income the Electrical Development Association is still doing a good deal of effective, if unspectacular, work. Development in the domestic sphere has naturally received a severe check, but the Food Economy Campaign has afforded an opportunity of keeping in touch with the consumers. Since the campaign started about ten weeks ago over half a million housewives have been attracted to demonstrations of wartime cookery and food preparation staged with E.D.A.'s help by numerous electricity supply undertakings. The electric vehicle has also been a subject for increased attention, and several exhibitions have been held which have secured a good "press." Difficulties in the way of obtaining materials have somewhat retarded rural extensions, but efforts are being made to persuade farmers who already have a supply to augment their equipment. In this connection a useful article recently appeared in a dairy farming paper describing what the E.D.A. display at this year's Royal Show would have been had that event not been cancelled. E.D.A.'s many other services are being maintained—as they must be if we are to go ahead again after the war—and we hope to say more about the matter in the near future.

E.I.B.A. Appeal

THE course of the war since the Electrical Industries Benevolent Association launched its special appeal a month or two ago has naturally had a very adverse effect upon the response. And yet the needs of the Association are as pressing as ever, and while calls upon our pockets are numerous and growing, this particular call is, after all, the intimate concern of all electrical people. If charity begins at home, the E.I.B.A. should receive the first consideration.

Grossly Exaggerated

WE are accustomed to hearing of the "biggest ever" from the United States, but we received a bit of a shock when we read beneath a picture in the *Electrical World* (New York) of the installation of two 40,000,000-kW turbo-generators by the Duke Power Co. Reading on, however, we recovered, for it was apparent that three extra noughts had crept in.

STEEL PRODUCTION

Arc Furnace Installed at North Wales Works

ALTHOUGH it has been in existence since the middle of the 18th century, the Brymbo Steel Co., Ltd., is to-day very much abreast of the times through having recently installed one of the most modern designs of electric arc furnace for the production of high grade steels. The new plant, one of the Electric Furnace Company's latest 5-7 ton "Efco" units, with hydraulically controlled electrodes, is being used to produce, at the rate of 150-180 tons of ingots (about 115 to 135 tons of billets) a week, about twenty-five different types of special steels.

To operate it a 3.3-kV supply is taken from the North Wales Power Co. through an oil circuit-breaker specially designed by Whitehead Switchgear and Inventions, Ltd., to withstand the very heavy duty imposed on it, with a rupturing capacity of 100,000 kVA. It trips on an average about twice a shift, due to the enormous surge arising when the electrodes burn holes in the charge and this suddenly collapses. Despite this harsh treatment the Whitehead patent laminated contacts incorporated show little or no wear, while the oil itself is found to keep in remarkably good condition. An oil pump is built in and the switch is remote operated by means of a solenoid, a Westinghouse rectifier being provided to supply the necessary DC. Overload coils and time delay mechanism are also embodied. From the circuit-breaker the high-voltage supply is taken to a 2,300-kVA Metrovick water-cooled transformer, which has six tappings giving 180, 160, 140, 114, 100 and 85 V, the full kVA capacity being available only on the top voltage.

Off-load motor-operated tap-changing gear, which is all fully interlocked, operates on the high-voltage side, all the meshing being effected outside the transformer.

The reactor provided on the transformer has tappings so that it is possible to obtain full, two-thirds, one-third or no reactance. The total reactance of the transformer, its bus-bars, the furnace and cables is about 30 per cent. All-welded sheet-steel construction is employed for the transformer building, other safety features include a Buchholz relay.

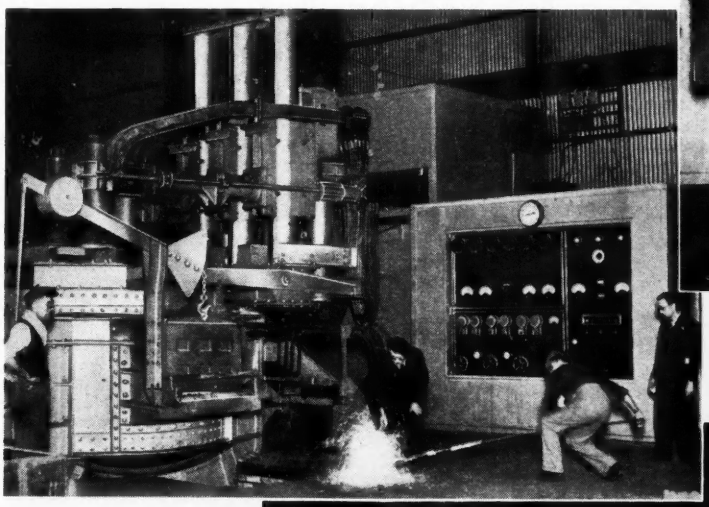
A pump keeps the circulating oil in constant motion, the usual type of conservator tank being fitted.

Three sets of bus-bars, each feeding one of the three electrodes embodied in the furnace, run from the transformer. To these bus-bars are fitted 6,000/15-A current transformers which are in circuit with relays. The latter are in turn connected with a hydraulic system which pumps soluble oil in water from a tank into an accumulator, from which three pipes are taken, one to each electrode. The pressure in the accumulator is maintained at 170 lb. per sq. in., a certain amount of compressed air being introduced into the accumulator to act as a cushion.

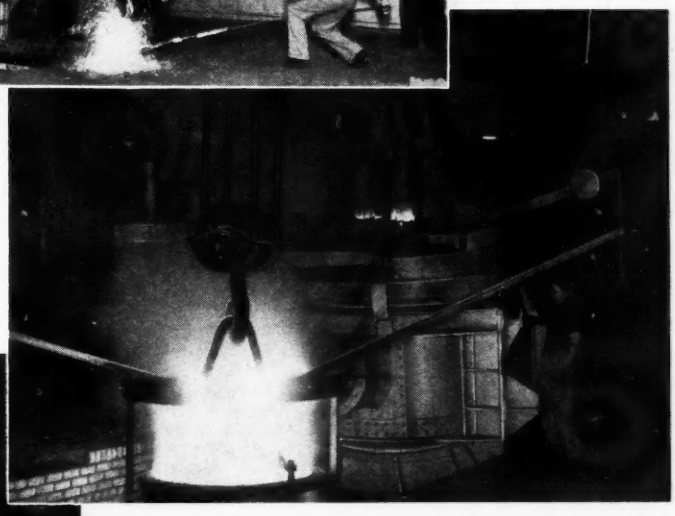
The pressure pipes from the accumulator feed the bottom of cylinders attached to the furnace. Pistons coming from the top of the cylinders are attached to the electrode carriages by means of crossheads. The electrode carriages themselves run on rollers on the electrode masts, which are of tubular steel construction. The pressure of the hydraulic supply and the diameter of the electrode raising cylinders are arranged so that counterweights are unnecessary, thus reducing inertia and giving quick response to changes in electrode current.

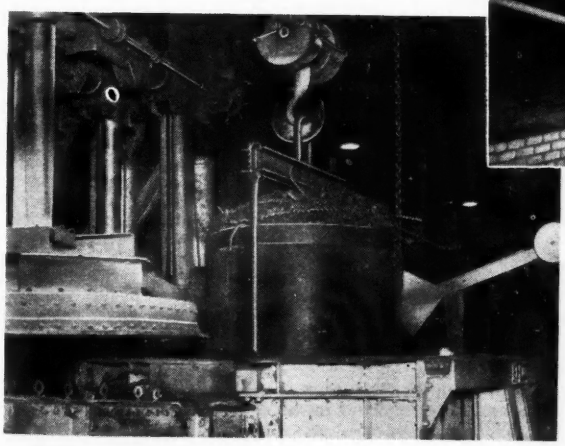
The amount of current passing through the electrode circuit depends on the distance of the electrodes from the charge, and as the relays are arranged to operate in accordance with the amount of current passing through the electrodes, it follows that whether pressure is applied to the electrodes or not

This Whitehead oil circuit-breaker has been especially designed for the furnace



General view of the "Efco" electric arc furnace at the Brymbo Works





The swing roof of the furnace facilitates charging (left) and removal (above) of the refined steel

depends on the position of the electrodes. Successful operation of the furnace demands control not only of current but of voltage too. The current variation is achieved by means of a selector switch giving seven different ratios—15/5, 13/5, 11/5, 9/5, 7/5, 5/5 and 3/5. If the electrodes were allowed to come down without voltage control, they would be damaged or else the steel would pick up carbon—a thing which has to be avoided.

Accordingly, to guard against this, voltage relays are connected between each electrode and earth. As the bath of the furnace is also earthed, the result is that the relay is short-circuited when the electrode nears the bath or scrap, and the electrode is automatically raised.

Maximum Demand and Consumption

For melting a charge, which takes on an average about two hours, one of the higher voltages is employed, but for the refining period, lasting from two to four hours, according to the type of steel, a lower voltage is necessary if burning of the furnace brickwork is to be avoided. The average initial load for melting is in the neighbourhood of 2,000 kW, with swings as high as 3,500 kW. These swings gradually decrease as the melting proceeds. As soon as melting is completed, and the refining starts, only 500 to 700 kW is required. On an average it takes about 570 kWh to melt a ton of charge, while for refining a further 230 to 280 kWh is needed. The temperature of the arc reaches about 3,000 deg. C., and that of the steel about 1,650 deg. C., though this figure varies according to the type being produced. The maximum demand of the furnace is 2,100 kW and the weekly consumption approximately 120,000 kWh. The furnace has the remarkably high power factor of 0.95.

The furnace is of the swing-roof type permitting charging by means of a patent charging basket at the top in only five minutes. An ingenious system enables a single hydraulic cylinder, operating at about 600 lb. per sq. in., to work both the roof and the furnace tilting mechanism, the changing of a steel pin from one position to another effecting the simple change over. This arrangement has the additional advantage that it is impossible inadvertently to carry out the two operations simultaneously. The electrode arms, too, are electrically interlocked by limit switches at the top of the mast, so that it is impossible to swing the top of the furnace unless the electrodes are in the fully raised position.

Water cooled arches are provided over the door and tapping spout to prevent body distortion and the whole furnace is on a U-shaped girder structure to prevent undue strain. The electrodes pass through cast-steel water coolers, on the top of which are cast-iron economiser segments. The electrode holders are of cast steel, not water cooled, and the holder tightening gear is spring loaded. The electrodes are 9 in. diameter graphite, and consumption is approximately 12-15 lb. per ton of steel produced.

Although the new equipment has been in operation only a few weeks, so simple and reliable is its working that the company is already planning to add a similar furnace with a slightly larger capacity (7-10 tons). Unfortunately, owing to the North Wales Power Company's distribution arrangements, it will not be possible for these two furnaces to melt simultaneously, but by staggering the melting operations, the second plant will, however, permit a considerable expansion of output. The rating of both furnaces will be the same, with the result that the larger unit will give slightly slower melting. Otherwise, with the exception of a modification of the transformer to give its full output at the top three voltages employed, instead of only on the top one, both units will be identical.

Power Costs

Due to high transmission costs caused by the location of the site where the furnace is installed, power costs are high compared with more concentrated manufacturing areas, and some special consideration to this on the part of the principal authorities involved would appear to be worthy of most serious consideration, as this new class of manufacture in North Wales, which involves electric furnace melting, is likely to develop rapidly both now and after the war. In fact, the future of employment in the district is going to depend at some later date very largely upon consideration being given to this all important point.

We should like to thank Mr. J. P. Bowman, joint general manager of the company, and his staff, and also Mr. H. G. Young, of the Electric Furnace Co., for their assistance in preparing this article.

Works Management

British and American Training Requirements

THE application of common sense is no longer sufficient for the needs of industrial management. At the other extreme, there is no exact science of management to which one can turn for a solution to all the problems and complexities encountered in running a business. But if management is not a science it certainly demands scientific quantitative thinking based on a knowledge of established principles and tried techniques.

One of the aims of "Engineering Economics. Book II.—Works Organisation and Management," by T. H. Burnham (Sir Isaac Pitman & Sons, Ltd., price 10s. 6d.) is to direct attention to the necessity for criteria of industrial efficiency and optimum values. In the chapter on "Economics of Production" the author gives a brief mathematical analysis of optimum lot sizes, of the selection of materials and equipment, and of the economics of jigs and fixtures. In subsequent chapters, least cost purchase quantities and the economics of material handling equipment are treated in the same manner.

A word of warning should perhaps be given in this connection. On paper it may seem possible to develop such a set of formulæ that almost all business problems can be resolved to a statistical basis. In practice, however, it will be found that equations and calculations cannot replace sound judgment based on practical experience. The value of mathematical treatment is, or at least should be, that it assures that adequate consideration is given to all of the measurable factors affecting a decision.

The recognition of the value of scientific thinking in management is probably the reason why management as a profession is growing in its appeal to the young engineer and why in fact management is gradually taking shape as a branch of engineering. The Institution of Mechanical Engineers has been associated with this movement for some sixteen years and this book, together with its companion volume "Elements of Industrial Organisation and Management" by the same author, covers the broad syllabus of the Institution's Examination, Section C. An appreciation of the author's success in meeting his aim can be gathered from the fact that the work is now in its fifth edition.

Another book on this subject which has recently entered its fifth edition is "Principles of Industrial Organisation," by Dexter S. Kimball and Dexter S. Kimball, jun. (McGraw-Hill Publishing Co., Ltd., price 26s.). A comparison between this standard American textbook on industrial administration and its English equivalent reviewed above provides a very interesting picture of the relative progress in the two countries of the movement for managerial training. Each book is written primarily for the needs of young engineers and in each case the author endeavours to deal with general principles only.

It is quite obvious, however, that the interpretation of "general principles only" is very different. The degree of detailed knowledge demanded from the American student is obviously such that no reader of Mr. Burnham's book could hope to pass an American examination on the subject. Mr. Burnham does not pursue his subject deeply enough, judging by American standards. The Kimballs take their reader right out on to the shop floor, they carry right through to the extremes of refinement in scheduling and operation standardisation, and in general show him how the wheels go round and why. On the other hand, Mr. Burnham rarely, if ever, gets out of the shop office.

This does not mean that Mr. Burnham's book is not a good one or that the Americans' is an excellent one. The position is rather that whereas the English examination authorities demand, say, a matriculation standard in industrial engineering, the American requirements are nearer B.Sc. standard. Each author caters successfully for his particular market, but obviously the American book is likely to be of more interest to the practising manager.

The question arises whether the relatively elementary English training is sufficient compared with the more intensive American standard. A recent study in the American magazine *Fortune* shows that while the big corporations have for many years been recruiting candidates for management from the colleges, only rarely has a company been able to trace back much of its top personnel to this source. The system can be counted on to supply lieutenants and captains, but few colonels and generals. The primary essential is not so much a knowledge of production methods as the ability to understand and manage people. Academic training is certainly very useful, but one wonders whether if taken beyond a certain point it does not mean spending time at the library desk that could be more profitably employed in the school of practical experience. —A. W. W.

ELECTRIC ARC WELDING

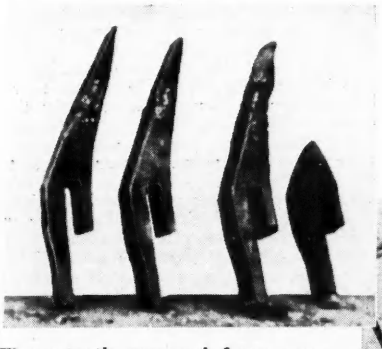
Recent Progress

By E. Dacre Lacy

WAR conditions may confidently be expected to lead to a substantial extension of the use of electric arc welding in all directions. As the war of 1914-1918 brought this process into prominence so the present emergency will undoubtedly establish welding permanently as the most efficient means of fabricating metals of all descriptions. During the last twelve months considerable developments have taken place in the manufacture of welding equipment and electrodes, and owing to the large amount of research work now being carried out, welding technique has consistently improved during this period.

In 1935 a schedule of proposed research was drawn up and approved by the seventeen societies associated with the Iron and Steel Institute in organising the Symposium on the Welding of Iron and Steel in the same year. These societies agreed that the co-ordination of research should be undertaken by the Institute of Welding, which accordingly appointed a Research Committee which is representative, as far as possible, of all appropriate institutions and interests.

With the completion of its second year of work the Committee is in a position to report on the progress made in organising a general programme of research to indicate what additional work is necessary to cover the field originally outlined, and to decide the methods by which the programme as a whole will be carried out. The Committee is also responsible for collecting and disbursing the funds. The schedule of proposed research was taken as the basis of the programme on the welding of iron and steel, and work has now been put in hand on most of the items listed. Schedules relating to the welding of non-ferrous metals and to the resistance welding of ferrous and non-ferrous metals have since been drawn up and work has been commenced.



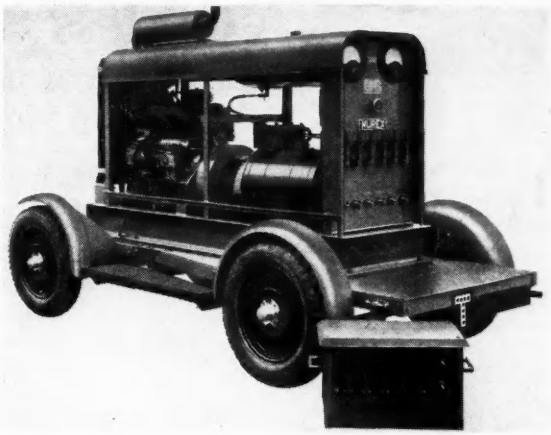
Three teeth removed from excavator in condition shown by the fourth on the right hand and built up by welding mild steel and then covering with two runs of hard surfacing

The Committee had two courses of action open to it: *viz.*:—To concentrate its attention on a limited number of problems of special importance or to initiate research covering generally the range of applications of welding in engineering practice. The former method might appear to promise the greatest immediate return for a limited expenditure, but having regard to the certain future requirements of industry, it was decided to adopt a more comprehensive programme and to work through it as a whole as far as funds became available.

Any risk of commencing more than could be completed is believed to have been averted, because the majority of the twenty-eight committees, sub-committees and panels working on different parts of the programme have now defined their problems more or less clearly, and as the work passes into the hands of individual investigators the task of administration becomes less. The amount of administrative detail work, however, will continue to grow as the various projects approach completion.

Recently doubts as to internal stress in weld metal and the behaviour of welded joints under fatigue have been reported to have caused hesitation to adopt welding for important structures for which otherwise it was well suited. It is good to see, therefore, that these objections are steadily being countered by official pronouncements from the authorities concerned. The question of the fatigue properties of welded joints has, so far as service in boiler drums and similar vessels is concerned, now been largely settled by the third report of the Welding Research Committee of the Institution of Mechanical Engineers.

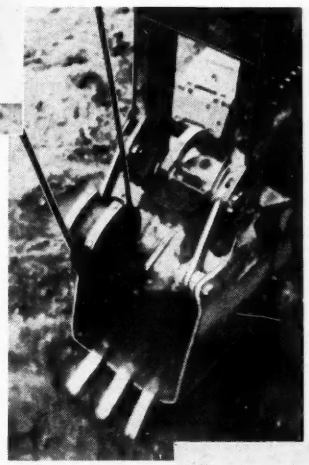
This Committee contains the names of almost all of those most eminent in this country for work on the fatigue of metals. Its findings will, therefore, be certain of unqualified acceptance and should dispel any lingering doubts as to the efficiency of weld metal in resisting alternating stresses under similar conditions to the plate on which it is employed. The Committee has been in an unusually favourable position in that, in addition to work on test samples, it has been able to test actual boiler drums under conditions parallel to those obtained in service, and has found theoretical conclusions entirely confirmed in practice.

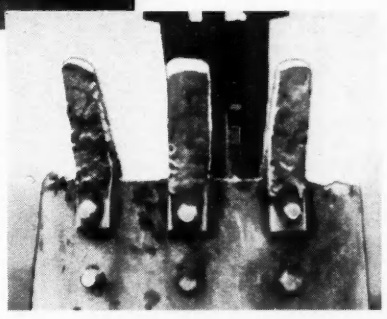


Portable arc-welding set (Murex Welding Processes, Ltd.)

It is explicitly stated in this report that all the tests carried out and all the conclusions drawn refer to standardised conditions of welding and procedure control, all of which were fully investigated and stabilised before the work referred to was embarked upon. It becomes more and more evident that this is the key to future progress. Gradual recognition of the merits of welded work is inevitable, provided standardisation of procedure and a rigid inspection system go hand in hand. It would be infinitely preferable that the pace of technical development should be slowed down to ensure this, if it should be necessary, rather than that this vital point should be neglected.

The application of approved procedure should be hastened to the maximum extent. If the use of welding in this country is in any degree behind developments abroad, and particularly in America, it is because of this factor alone and not of any lack in technical advances. Once this is appreciated, welding in Great Britain is certain to be well in the van of progress.





Below: Repaired excavator teeth after working for some time in wet gravel and sand. Left: Same teeth used later for opening up new pit

Turning to the practical aspect, the absence of a main supply of electricity presents no obstacle to welding in the heaviest work, as portable engine-driven welders have reached a high stage of efficiency. A recent example is provided by the construction of a large gasholder. Current for welding was supplied by a 1,500-RPM Diesel (served by a 12-gal. fuel tank) driving a level compound-wound dynamo with a rated output of 600 A at 60 V. Six welding circuits with a series regulating resistance in each were provided, controlled by fuses and a single-pole switch. The complete unit was mounted on a four-wheeled pneumatic tyred trailer.

A new "hard-surfacing" electrode for depositing very hard metal, resistant to abrasion and possessing toughness against

impact, on the worn edges of such implements as rock drills, excavating buckets and ploughshares has been developed This obviates the difficulty found in the deposition of steel which requires case-hardening, since the implements cannot usually be dismantled for heat treatment. The electrode is employed in the same manner as are mild steel electrodes and is suitable for AC or DC from 70 to 135 A depending upon the gauge of the electrode, *viz.*, No. 8, 10 or 12. The deposit may be increased in depth by superimposing to any required thickness.

Much of the work in progress in connection with welding research is now of national importance, and where possible this should be accelerated, despite difficulties, and an effort should be made to render its results immediately available to industry. One of the foremost requisites for the efficient use of welding is a sufficient supply of trained welders, and the Institute of Welding is now working out a scheme for the training of welding supervisors and operators, for whom there is an increasing demand.

The Institute has undertaken several other schemes of national importance. For instance, a scheme is in operation with the approval of the Lord Privy Seal for organising the facilities of welding contractors for the repair by welding of structures damaged by air bombardment. Full co-operation has been established by the Institute with the three Defence Departments.

Oil-less Switchgear

The Position of the Small Manufacturer

By E. B. Watton, A.M.I.E.E.

IN the days when, despite theorising, practically no one really knew anything about circuit-breaking, one man's guess was as good as another's, and the small firm could compete with the larger on an equal footing in many lines of manufacture. Indeed, his overheads being lower, he was often able to offer a comparable product at a lower price.

Now that circuit-breaking is becoming an exact science and design is based on the intelligent application of an almost infinite amount of knowledge, painfully garnered as the result of elaborate research, the large manufacturer, having access to that knowledge, has a considerable advantage over the small manufacturer, who cannot afford the colossal expense of an ambitious testing programme. It is no use blindly copying the work of others, as test results show that the most trivial details may have quite a disproportionate effect upon performance.

The small manufacturer has so far survived the onslaught of the tested circuit-breaker. Now he is faced with a further menace to his peace of mind—the oil-less circuit-breaker. None can forecast the progress which the oil-less breaker will make in this country during the next few years in its application to all voltages. There is still far too little published information as to its exact capabilities. Of one thing, however, we may be fairly certain; that the change-over, if it arrives, will not do so suddenly. Even if its superiority were unchallenged, there is still the economic factor to be taken into account, and the user, no less than the manufacturer, could not afford the wholesale scrapping of existing designs of oil circuit-breakers, for so many years the basis of switchgear business.

On the other hand, a recent I.E.E. paper* and the ensuing discussion appeared to indicate agreement as to the superiority of the air-breaker in the low- and medium-voltage range, a view that is confirmed by the number of units of this class sold by at least two large concerns in the past two years. It is, therefore, unfortunate for the small manufacturer that this range is the one from which he draws the major proportion of his revenue.

The number of small firms producing a serviceable line of oil-break industrial switchgear is larger than is sometimes supposed. If the demand for air-break gear increases, to the detriment of these existing lines, how will the small manufacturer react? Will he himself produce such a line? The difficulties confronting him are obvious, as it must be borne in mind that the air-breaker referred to is not the one with which we have all been familiar throughout our careers and which, with its long break between carbon tips and its comparatively leisurely action, has remained substantially unchanged for at least three decades. It is, instead, a rejuvenated and translated unit, with an exceedingly high-speed action and short arcs, enclosed and scientifically controlled. This gear was evolved as a result of years of testing and experiment.

If the small manufacturer is able to afford to do likewise, by all means let him, but it is, in my opinion, not a practical solution of the immediate difficulty. Or will he indulge in intensive propaganda among his customers, maintaining that the new gear is but the swing of fashion's pendulum, and thus assist in laying the foundations of a controversy which might rival the classic AC-DC controversy of earlier days? Hardly, if he has vision and foresight, as such action will produce no permanent cure, and possibly not even a temporary alleviation.

It must gradually be recognised generally that the air-breaker, being swifter and more consistent in action, easier and cheaper to maintain and practically immune from fire risks, has definite advantages over the oil-breaker for *high rupturing capacities*. In those italics lie the salvation of the small manufacturer, for where rupturing capacities are not high, the air-breaker has two definite disadvantages: it is both bulky and expensive, particularly for the lower-current ratings, as compared with the average industrial oil-immersed unit. There are still many situations where short-circuit values do not run into astronomical figures and here there is likely to be a market for the oil circuit-breaker. Although the small manufacturer may lose some of the high-rupturing-capacity business, that, paradoxical as it may seem, may be to his ultimate advantage.

There is still an all-too-inadequate understanding of the problems attached to lower-voltage rupturing capacities. Specifications vary between the extreme cases of ignoring them altogether, when they are really important to calling haphazardly for 50,000 kVA on the 400-V side of a 100-kVA transformer, the expression "50,000 kVA" being used as a kind of yardstick to measure the size of gear required, and meaning much the same thing as a tank size of about ten gallons.

The small manufacturer's best card, in the long run, is absolute frankness and co-operation with the larger firms in the spreading of an improved understanding of these problems. The fact must be faced that there are two distinct markets, in addition to innumerable borderline cases. There is the real high-rupturing-capacity market, where only the best will do, irrespective ofo price, and there is the market ruled by the economic factor, where price is all-important, and the requirements are not so stringent—where, in fact, the best would be a waste of money.

Both small and large manufacturing concerns have their place in the scheme of things, and neither will derive any permanent benefit from grabbing each other's business. The large firm will not sow the seeds of customer goodwill by frightening a customer into buying gear which is unnecessarily expensive, nor will the small firm do any good by assigning fictitious nominal ratings to untested gear, or even consenting to install any gear unless honestly convinced that it is on top of its job, without any "ifs" or "buts."

A great deal of gear is still installed which is totally inadequate for its actual duty, and every breaker failure, even if unattended by loss of life or injury is, at the best, a bad advertisement. Intelligent co-operation between large and small concerns will bring its immediate and obvious reward.

* Cox and Druoquer "Oil-less Metaclad Switchgear for medium voltage AC Circuits."

Tracing Algebraic Curves

THE use of a cathode-ray oscillograph as an algebraic curve tracer is described in the journal of the Institute of Electrical Communication Engineers of Japan.

The discharge transients of resistance-capacitance circuits are utilised to trace the curves of high-degree equations of a single variable and give their real roots. It is not difficult to make the error of the roots less than a few per cent. As compared to other devices for computing roots, it is claimed, this apparatus does not fall short in precision if ample care is taken. It is simple to construct, easy to operate, and capable of showing the curve of the equation. Also, in solving a high-degree equation of a single variable, if only the roots are desired, another method would be to use electrostatic or vacuum-tube voltmeters in place of the cathode-ray tube, causing them to indicate the root.

Another method of representing the radical is the use of sine waves instead of the transient phenomena of resistance-capacitance circuits. From the fact that the terms $sin^2\theta$, $sin^3\theta$, &c., can be reduced to the harmonics $sin\theta$, $cos2\theta$, $sin3\theta$, &c., it is possible to produce the curve of an nth degree equation by providing n oscillators having harmonic relationships with each other. With such a device the curve would be repeatedly retraced on the cathode-ray tube, so that it would not be necessary to use a fluorescent screen having a long (image) persistence. The disadvantage, however, would be that the required output voltages of the harmonic oscillations would not be proportional to the coefficients of the respective terms, and hence their adjustment would be complicated.

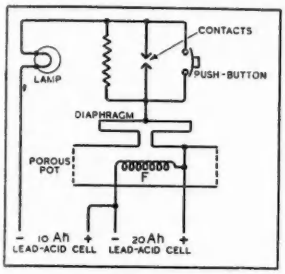
GAS DETECTORS IN MINES

Types Available and Principles of Operation

By T. R. Barnard, B.Sc.

DETECTION of firedamp or methane in collieries has recently become an acute problem in view of the increasing number of electric motors employed underground. Flame safety lamps, on which reliance has always been placed as detectors, are being replaced in ever-increasing numbers by electric lamps. Twenty years ago the percentage of electric lamps was only 28; in 1938, the latest year for which figures are available, it was 73.

Under the Coal Mines Act power must be cut off from any motor if the percentage of firedamp present exceeds 1¼, and a flame lamp must be used in conjunction with every motor. Since 1¼ per cent. of gas is not visible in the lamp unless the flame is lowered for testing, and since motor drivers were not required to be trained to test for gas, this rule was ineffective. Following the report of a special committee in 1938, new rules were framed, requiring, among other things, the use of an *automatic* detector with every electric motor at work on the coal face in seams where safety lamps are compulsory (Coal Mines General Regulations, Firedamp Detectors, 1939).



Circuit of Ringrose alarm

The flame safety lamp is not a satisfactory automatic detector of low percentages of firedamp, since less than 2 per cent. can only be recognised by making a definite test with a lowered flame. Many attempts have been made to devise an apparatus that would give visible or audible warning of the presence of small percentages of gas. Some have been firedamp alarms pure and simple, while others have combined the detector with a lamp. The second type is preferable, since the collier must carry his lamp with him; the temptation when both a lamp and a detector are issued is to park the latter and forget about it till the end of the shift. The most promising line of attack so far has been to combine the detector and lamp in one unit in such a way that the presence of firedamp above a predetermined percentage results in the light of the electric lamp being dimmed.

Automatic Apparatus

In the Ringrose miner's lamp, type CH4, a 4-V lead-acid lamp is combined with the detector, which comprises a palladium filament enclosed in a porous pot, to which the surrounding atmosphere has access through a gauze. The filament is maintained incandescent by the battery. Firedamp enters the pot and is burnt on the filament; the resulting reduction in pressure acts on a flexible metal diaphragm which is in communication with the pot, opening a pair of contacts in the electrical circuit, and putting a resistance in series with the bulb, so that the light is dimmed. The percentage at which this occurs can be set by adjusting the diaphragm contacts. The light can be restored by a push-button switch, which short-circuits the resistance, enabling the user to withdraw to a place of safety.

While the Ringrose is at present the only approved automatic detector on the market, there are several non-automatic ones available. As firedamp is lighter than air it will diffuse into a porous vessel more quickly than the air inside the escape. The resulting increase in pressure can be measured, and this was the basis of the Ansell detector, brought out as long ago as 1886. This effect has not as yet been applied successfully to the automatic detection of gas.

When firedamp is burnt in a closed chamber a reduction in pressure occurs, because the products of combustion, carbon dioxide and water, occupy only a third of the volume of the gas and oxygen consumed. This phenomenon is used in the Ringrose detector, and it is also the basis of the successful McLuckie instrument. The latter is, however, more in the nature of a convenient portable gas analysis apparatus than a detector and is not automatic.

When a firedamp-air mixture is burnt over a heated filament the temperature, the resistance and the brightness of the filament are all increased, and any of these changes may be used to detect gas. The approved Thornton lamp measures the amount of gas present photometrically by comparing the brightness of the glowing filament with that of a small lamp housed beside it. While a useful lamp for officials, this is again not automatic.

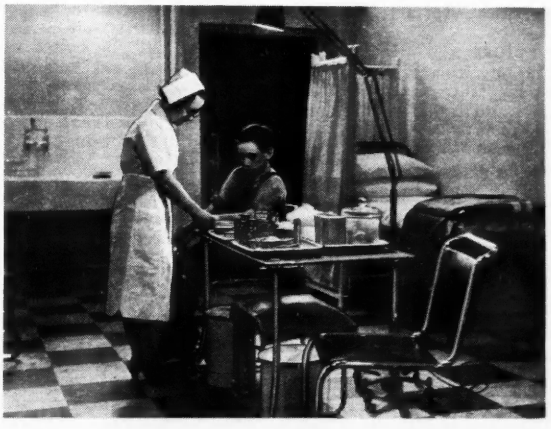
Wheatstone Bridge Device

The Ceag-Montlucon detector, which is provisionally approved, uses the change in the resistance of the filament to determine the percentage present. Four filaments are used to form the arms of a Wheatstone bridge, with a milliammeter connected across it. Two diagonally opposite arms are hermetically sealed, while the other two are exposed to a sample of the atmosphere to be tested. The filaments are heated by the battery of the bull's-eye lamp on which the detector is mounted. If gas is present, the balance of the bridge is upset, and the milliammeter registers the percentage on a scale calibrated to read direct up to 4 per cent. of gas in steps of 0.1. As designed at present, a test must be made to discover the presence of firedamp, but it would seem possible to utilise the same principle to detect gas automatically. The increase in temperature consequent upon the burning of firedamp on a heated filament offers obvious possibilities, and there is little doubt that the real and pressing need that exists will cause new designs of automatic detectors to be perfected.

Factory A.R.P. Scheme

THOUGH forming part of the company's comprehensive A.R.P. scheme the new first-aid centre just completed at Veritys works is already proving of great value for dealing with ordinary works accidents. It is in charge of the company's own medical officer and a hospital sister and is fully equipped for the treatment of injuries of every description. If necessary it can function as a self-contained hospital unit for a considerable period.

The building is divided into two identical halves for male and female patients, with doctor's and sister's rooms, &c. Adjoining the main ambulance rooms are rest rooms each containing beds for seriously injured cases. Entrance to the adjoining gas-cleansing section—again one for each sex—is gained through double doors and air locks. The connecting dressing room has exits to the ambulance and rest rooms and the main entrance. Storage space has also been provided for the A.R.P. personnel equipment.



First-aid post at Verity's works

The employees and staff have been trained in the various services. Special attention has been given to first aid and the teams gain practical experience periodically at the first-aid centre. Normally half are on duty during the day and night shifts. The remainder of the A.R.P. personnel comprises control officers, wardens, firemen, and decontamination and rescue squads, all these services being maintained during the night. A continuous record of the personnel available at any time is provided by a control panel with the names of all members and a device indicating whether they are in the building. The A.R.P. scheme is tested periodically without previous warning. On the last test the evacuation of the works, with the services fully manned and in position, was completed in a few minutes, and credit is due to the personnel for the degree of efficiency which they have attained.

The shelters themselves have been constructed both within buildings and underground. Veritys have a strong factory unit of the Local Defence Volunteers, most of whom have served in H.M. Forces.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Electric Gas Lighters

WITH regard to the correspondence appearing in the REVIEW during the last few weeks about electric gas lighters, we have in stock one of these which we purchased from the Sloan Electrical Co., Ltd., of Fetter Lane, E.C., some year ago.

It is of the generator spark type with a floating control so that when the lighter is held in the downward position it is ready for lighting the gas. It is suitable for 110-220 volts AC and is marked "D.R.P."

We believe that this may be the lighter described by Mr. Scarborough and should be pleased to give further information if desired. TAMPLIN & MAKOVSKI, LTD.

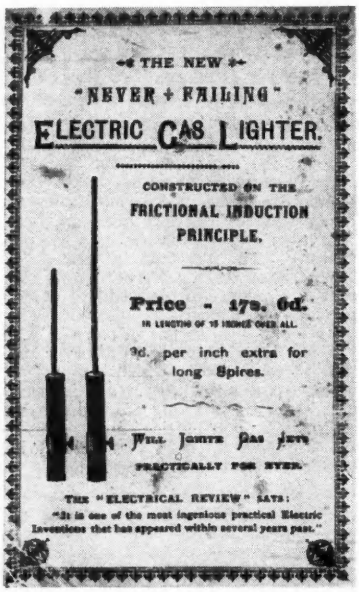
T. JOHNSON,
Sales Department.

Reigate, *July 15th.*

The G.E.C. product referred to in recent correspondence (Clarke's Patent) was in common use at Veritys London warehouse for igniting open type gas burners in the warehouse, stores, &c. The enclosed cutting from Veritys' catalogue published about 1896 illustrates the article. The apparatus, as a correspondent pointed out in a recent issue, worked on the Wimshurst principle actuated by geared push button.

London, W.C.1, *July 12th.* A. TUBBS.

[We have now before us a copy of a catalogue issued about 1886 in which one of these appliances is advertised. The catalogue was produced by the Electric Apparatus Co., Ltd. (which was later known as the General Electric Apparatus Co., and in 1889 became the G.E.C.), and the lighter here advertised is evidently the one referred to by Mr. Nicholson in his letter published in our issue of July 5th. We consider the advertisement worthy of reproduction, particularly as it contains a commendation of the device by the ELECTRICAL REVIEW. There are a number of other things in the catalogue which we would like to reproduce if space permitted, especially a picture of a gentleman in a bath surrounded by "all the necessary appliances for constant current and Faradaic current application."—EDS. ELEC. REV.]



Illumination Values

With reference to your leaderette of July 5th and Mr. Long's letter, it is doubtless true that the term "intensity" is incorrect when used to describe illumination, and in this organisation we endeavour to refer to a level, a value, or a degree of illumination, but we also use the expression "high (or low) intensity *lighting*" because it is so readily understood.

In written matters we agree that errors of nomenclature should never occur, but we fear that despite the best intentions, all of us may occasionally—but perhaps inexcusably—use the wrong word.

London, W.C.2, *July 12th.* E. B. SAWYER,
E.L.M.A. Lighting Service Bureau.

If I were required to base my judgment very strictly on the quotations from the B.S. Glossary given by Mr. Long in his letter in your issue of July 5th, I should be reluctantly forced to concede his point—that the word "intensity" has been used by this Glossary in referring to a source of light, and not in referring to the illumination which the light produces on a surface. But on every other ground I am in entire agreement with your leaderette of July 5th. The word "intensity" is used scientifically in many contexts (*e.g.*, referring to magnetic and electrostatic field strengths and to sound levels) and is almost synonymous with "magnitude," "strength" or "value"; and the expression "intensity of illumination" is, I think, common scientific parlance, whatever the Glossary may say.

It seems to me undesirable to restrict the use of a general term such as "intensity" to a particular application, and the expression "illumination intensity," so far from being a hybrid, seems to me synonymous with "illumination value"; that is, unless the ordinary meaning of the word "intensity" has been arbitrarily restricted.

In my opinion it is better to use a slightly longer definition which carries its own meaning than a portmanteau word whose definition must be memorised, and I would define the foot-candle as "a unit of the intensity of illumination produced on a surface . . . ." and the candle-power as "a unit of the intensity of a light source . . . ." In either case no special significance is "loaded" on to the word "intensity," and in both cases the definitions carry some information, which, incidentally, is especially valuable for instructional purposes.

The University, Liverpool, *July 12th.* G. H. RAWCLIFFE.

Commutator Trouble

"Commutator" may find the cause of the few blackened commutator bars to be faulty assembly. This is especially likely to be the case if these bars are adjacent and the remainder of the commutator is unspoiled. It sometimes occurs that the insulated cone ring that supports the commutator on the bearing side has not been fitted tightly enough. The tightening of this and resurfacing of the commutator may be the cure. Alternatively the few mica segments at the blackened spot may have become "proud" through inequality of wear—in this event recessing is the remedy. A good many commutator troubles are due to inequality of material, slack assembling and irregularities of surfaces in contact under pressure causing uneven expansion with heating.

Wembley, *July 12th.* E. H. CROOK, A.M.I.E.E.

Inquiries for Switchgear

In his very interesting article, your contributor "Cubicle" describes as inexcusable the requirement for an earth leakage trip on insulated-neutral systems.

This is, however, not as fantastic as it sounds, as the voltage-operated earth leakage trip can be, and is, used on systems with insulated neutrals, as, if of any extent, there is sufficient capacitance from any two phases to isolate a leakage from the third. Connected between metal to be protected and earth, this device functions equally well on insulated or uninsulated neutral systems.

Folkestone, *July 13th.* T. C. GILBERT, A.M.I.E.E.

In the Courts

Boy Killed in Refrigerator

THE father of a butcher's boy who received a fatal shock while assisting to put a new lamp in an electric refrigerator claimed damages at Manchester Assizes recently from Albert Howard, meat trader, Rochdale. The judge said that the evidence revealed disgraceful negligence or hopeless incompetence on the part of the person responsible for fixing the lighting equipment for the refrigerator. A reasonable man was entitled to believe that when the switch was at "off" the wires were perfectly safe, and it was obvious that the defendant, the switch being off, could not be said to have been guilty of any neglect of duty in the ordinary sense of the words. Defendant had not himself installed this lamp, but had taken it over five years earlier, and all through that period it had worked perfectly satisfactorily.

It had not yet been established that a master on whose part no negligence had been shown was liable at common law when an accident arose from the negligence of workmen employed by some previous occupant of the house. Judgment was given for defendant.

Damages for Death of Husband

Judgment for an agreed sum of £1,650 with costs was given by Mr. Justice Charles, at Leeds Assizes last week, for Mrs. A. Brownell, of Sheffield, in respect of the death of her husband, Frederick, a painter, aged 24, who was killed by an electric shock at the Blackburn Meadows power station of the Sheffield Corporation Electricity Department. Brownell was employed by Flint Bros. (Decorators), Ltd., Sheffield, sub-contractors to the Mitchell Engineering Co., Ltd., of London, who were building plant at the power station, and met his death while painting a girder. It was stated that the defendants, Sheffield Corporation and Messrs. Mitchell, had agreed to share the damages and waive the question of liability which was originally raised between them.

The Judge approved that £400 of the damages should be apportioned to Mrs. Brownell's 18-month-old daughter.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE awards in last week's Birthday Honours List were confined to the three fighting services, all civil honours being postponed to a more appropriate date. From a perusal of the list we note that **Lt.-Col. B. H. Leeson,** T.D., M.I.E.E., late Royal Engineers, Territorial Army, has been awarded the O.B.E. (Military Division). Our readers will recall that Lt.-Col. Leeson recently relinquished command of his unit, the Minister of Supply having represented to the War Office that in the national interests of production and export he was required for special duties in his engineering capacity as a director of A. Reyrolle & Co., Ltd. The D.S.O. has been awarded to **Lt.-Col. J. R. Kennedy,** A.M.Inst.C.E., A.M.I.E.E., R.E., Territorial Army, who before the war was on the staff of Merz and McLellan, consulting engineers, Newcastle-upon-Tyne.

Capt. Benjamin Starling, eldest son of Mr. and Mrs. F. H. Starling, of Beeston, Notts, has been awarded the M.C. for gallantry in the defence of Calais. Capt. Starling is manager of the London office of Blackburn, Starling and Co., Ltd., electrical engineers, Nottingham.

Second-Lieut. D. C. Johnston Bell, Royal Corps of Signals, was recently awarded the Military Cross. The official statement says that "he was commanding a detachment of dispatch riders and worked day and night for two weeks to keep communications open. His energy, resource and total disregard of personal danger set a fine example." Mr. Johnston Bell was a serving Territorial at the outbreak of war, and up to that time had been the Northern Area sales engineer of Belling & Co., Ltd.

Mr. R. Gillespie Williams, late general sales manager of Holophane, Ltd., has joined W. J. Furse & Co., Ltd., of Nottingham, London and Manchester. Mr. Gillespie Williams will concentrate upon the development of theatre lighting control equipment in this organisation. New type remote dimmer control is being produced with special advantages suitable for colour lighting of all kinds, also a new system of four-colour lighting.

Mr. R. Gillespie Williams

Mr. Emil Braathen, chief technical assistant in the Hackney Borough Council Electricity Department, and senior lecturer (engineering) at the Hackney Polytechnic, has been appointed deputy chief engineer to the Stretford and Distric Electricity Board, Lancashire.

Mr. Robert Robertson, LL.D., has been appointed chairman of the Clyde Valley Electrical Power Co. and its associated companies, in succession to Mr. Charles Ker, LL.D., whose death is reported below.

Messrs. Handcock & Dykes, consulting engineers, inform us that **Mr. W. T. Townend** has ceased to be a partner of the firm, which will be carried on as hitherto under the old name by the remaining partners, Mr. H. Murray Winstanley and Mr. Charles W. Smith.

The appointment of **Mr. W. A. Scott** to the control of one of the new Government ordnance factories marks yet another contribution from the electrical industry to the nation's munitions effort. Mr. Scott, in resigning the position which he has occupied for the last ten years as works manager of the Lancashire Dynamo Works at Trafford Park, severs a long connection with the production side of the electrical industry.

Worcester Corporation has appointed **Mr. G. S. Tanner,** senior technical assistant, as mains superintendent of the Electricity Department, and **Mr. H. F. Hudson,** meter superintendent, as consumers' engineer, the latter being a newly created post.

Alderman J. W. Longley, chairman of the Bradford Electricity Committee, announced his resignation from the City Council at last Tuesday's meeting of that body.

Basingstoke Corporation Electricity Committee has appointed **Mr. R. J. Harley,** of Whitehaven, as senior assistant engineer.

Mr. C. Jago Gregg, manager for Falk, Stadelmann & Co., Ltd., Glasgow, was married on July 5th at Glasgow, to Miss Elizabeth Sillars Wilson, of Galston, Ayrshire.

Mr. T. J. Horgan, B.E., B.Sc., of 30, Haddington Road, Dublin, has been appointed sole agent in Eire for the Metropolitan-Vickers Electrical Co., Ltd. The Company's agent for Northern Ireland will be, as hitherto, **Mr. A. E. McConnell,** of 55, Waring Street, Belfast.

No other nominations having been received by the Council of the Institution of Electrical Engineers, **Mr. J. R. Beard,** M.Sc., has been elected president of the Institution for the 1940-41 session.

Mr. R. W. L. Harris, B.Sc., A.M.I.E.E., A.M.I.Mech.E., who served his student apprenticeship with A. Reyrolle & Co., Ltd., from 1925 to 1930 and has since been a member of their staff, has now relinquished his appointment with the company on joining the staff of Kennedy & Donkin. Up to the time of Mr. H. W. Clothier's death in 1937 Mr. Harris served for some years as his personal technical assistant and latterly was attached to Reyrolle's London office.

The engagement is announced between **Captain R. W. Metcalfe,** Green Howards, only son of Mr. J. and Mrs. Metcalfe, of Richmond, Yorks, and **Miss Betty Tillotson,** younger daughter of Mr. S. Tillotson, borough electrical engineer of West Hartlepool, and Mrs. Tillotson. Miss Tillotson, who was trained at the Edinburgh College of Domestic Science, is a member of the demonstration staff of the Newcastle branch of the General Electric Co., Ltd., and is temporarily engaged in forwarding the Food Economy Campaign in her home town on behalf of the electricity undertaking and the local education authority.

A most successful social and fair was organised by the London Branch of the Electrical Association for Women on July 10th, in aid' of its Mobile Canteens Maintenance Fund. The president, the **Dowager Lady Swaythling,** received the guests, and during the proceedings the chairman of the London Branch, Mrs. F. W. Leevers, introduced the donor of the first canteen, Mrs. William Paterson, who explained the war service of the E.A.W. welfare canteens. A sum of £60 was raised by the "bring and buy" sale, various raffles, stalls, &c., and the Dutch auction, which included a gold match-case presented by Sir John Anderson, the Home Secretary. A sixth canteen will shortly be ready and this is to be the first "all-electric" mobile unit.

Mr. E. Smith has been appointed deputy electrical engineer and manager of the Shipley U.D.C. electricity undertaking. Mr. Smith was distribution engineer with the Department.

Mr. B. A. G. Churcher, M.I.E.E., has been awarded the honorary degree of M.Sc. by Manchester University. The conferment took place on July 5th. Mr. Churcher is a senior member of the research department of the Metropolitan-Vickers Electrical Co., Ltd., where, under Dr. A. P. M. Fleming, director, he is responsible for work on electrical and magnetic subjects and acoustics. In recent years he has initiated and developed the work carried out by the department on the measurement and analysis of sound in relation to minimising noise from electrical apparatus. He is the author of numerous papers, chiefly on electrical measurement and noise problems.

Obituary

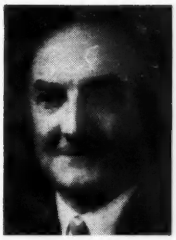
Lieut. W. G. P. Brigstocke, R.N.V.R., who has died from wounds received on active service, was an electrical engineer and a member of the Radio Society of Great Britain and of the American Radio League. He was thirty years of age and was educated at Sherborne and Manchester University.

Mr. C. Ker.—The death occurred in Glasgow, on July 8th, of Mr. Charles Ker, LL.D., chairman of the Clyde Valley Electrical Power Co. and a leading figure in the city's commercial and social life. He had been president of the Institute of Accountants and Actuaries for two terms. He was also a director of banking concerns, insurance companies, and the L.M.S. Railway Co.

Mr. L. W. Schuster, of Hale, Cheshire, whose death occurred on July 6th, at the age of fifty-nine, was chief research engineer to the British Engine, Boiler, and Electrical Insurance Co., Ltd., of Manchester. He was one of the founders of the Institution of Mechanical Engineers' Committee on Welding.

Mr. P. W. Willans.—We regret to learn that Mr. Peter W. Willans died on June 28th. Mr. Willans was very well known in the radio world; he had been prominent in the development of broadcasting for many years and was successively with Marconi's and H.M.V. and later acted as a consultant. Early this year he took up an appointment at the Royal Aircraft Establishment, South Farnborough. He was a member of the I.E.E. and he leaves a widow and three daughters to whom we extend our sympathy.

Mr. G. H. Robinson.—It is with regret that we have to record the sudden death of Mr. Geo. H. Robinson, joint managing director of T. Clarke & Co., Ltd., which occurred at his home on July 13th. Mr. Robinson had been associated with the company for thirty-eight years. Commencing as a youth, he became manager in 1916, was appointed assistant managing director in 1936 and joint managing director within the next two years. During his long period of service with the company he was concerned with some of the largest and most important electrical contracts placed in this country and many others abroad. He also took an active interest in all affairs connected with the electrical industry and his passing will be keenly felt, not only by his co-directors—Mr. E. J. Clarke and Sir Harold Moore—but also by his many friends in the industry.



The late Mr. G. H. Robinson

Mr. R. H. P. Tolley.—The death is reported in the *New Zealand Electrical Journal* of Mr. Richard Henry Payne Tolley, senior director of Tolley & Son, Ltd., Wellington, which occurred on April 4th in his 79th year. Mr. Tolley was born in London and in 1882-83 he was engaged on the electrical installation in the Grand Hotel, Charing Cross, which was carried out under the direction of Ayrton & Perry. He attended the Finsbury Technical College under Dr. Silvanus Thompson, and in 1884 went to Australia, where he was engaged on telegraph construction work, railway signalling apparatus and electric lighting and power installations. In 1892 he proceeded to New Zealand, and was for some years employed by the New Zealand Electrical Syndicate, Ltd., which at that time supplied electricity to Wellington. Later he joined Mr. H. A. Cederholm in business in Wellington as electrical engineers and contractors. In 1911 Mr. Tolley set up in business on his own account, and was joined in 1912 by his son, Mr. H. J. Tolley.

NEW BOOKS

Design of Television Receivers. Light-operated Cells. Gaseous-discharge Phenomena

Cathode Ray Oscillographs. By J. H. Reyner. Pp. 177; figs. 128. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 8s. 6d.

The author states that "the cathode-ray tube has ceased to be an expensive luxury primarily of academic interest." With this statement no one will disagree if it is confined to the sealed-off variety; the continuously exhausted equipment may run to nearly £1,000.

Immense progress has been made since the introduction of the first practical sealed-off oscillograph, which was placed on the market at £40 for the tube alone, the life of which was most uncertain. Now reliable instruments, including a good amplifier can be obtained complete at less than half this price.

The author is eminently suited to write a textbook of this kind, having an intimate knowledge of the practical design and operation of such apparatus. It is so easy for an inexperienced worker to obtain extraordinarily interesting figures with apparatus of this class, but whether they faithfully represent the phenomenon which it is intended to measure is quite a different matter.

It is only a really experienced worker who can apply the necessary checks to assure that all sources of error have been minimised, and who can then evaluate the degree of accuracy obtained. Such sources of error as "magnetic hum," all kinds of so-called "pick-up" and bulb charge to mention a few are dealt with; and practical methods of compensating for "mains ripple" are given.

As a minor criticism the section on root-mean-square and peak values tends to make a mystery of facts which should be a commonplace to all electrical engineers. In a future edition an account might well be introduced of the way the double beam tube and the "magic eye" work.—J. T. M-M.

Television Receiving Equipment. By W. T. Cocking. (Pp. 298; figs. 163; numerous half-tones.) Price 7s. 6d. Iliffe and Sons, Ltd., Dorset House, Stamford Street, S.E.1.

Although Britain could fairly claim to have been leading the world in television last year, the advent of the war has put an abrupt stop to practical transmitter, receiver and programme developments for the present. Nevertheless, there is still a strong interest in the subject in this country, and the publication of this new manual will add a notable volume to the literature on the subject of television receiving practice.

The author is a practical engineer who has had considerable experience in receiver design. In his preface he points out that to follow developments occurring in America, and to be in a position to get television started again in this country after the war, interest in the subject should not be allowed to lapse.

The book is written on the assumption that the reader is familiar with current sound receiver practice, but has no knowledge of television. Only cathode-ray tube receiving technique is described, and mechanical and projection systems are omitted. In all there are twenty chapters, covering all aspects of the subject, from general principles in the first chapter, to television servicing in the last. The cathode-ray tube, its construction and power supplies, are fully described, while the rival deflection systems (electrostatic and electromagnetic) are given a chapter each.

Information on saw-tooth oscillators occupies nearly forty pages, as befits its importance. It is followed by chapters on vision frequency, intermediate frequency and radio frequency amplification, while other sections of the receiver are treated in adequate detail. The separation of the synchronising impulses from the picture signal is extremely important, and the principles and methods of accomplishing this form another large chapter. Sound reception, special television circuits and the aerial are then covered. In a sense, the whole book leads up to the next chapter, on the complete receiver, in which special reference is made to the *Wireless World* magnetic television receiver, and large folded circuit diagrams, with component values, are inset. The book ends with two fairly brief chapters on faults, and television servicing. These are obviously not intended to be comprehensive.

The author has adopted a practical style, with clear explanations of the various processes occurring in the receiver, and he introduces formulæ wherever they assist in showing how the practical values of components can be calculated.—W. E. M.

Photo-Electric and Selenium Cells. By T. J. Fielding. Pp. 163; figs. 82. Chapman & Hall, 11, Henrietta Street, W.C.2. Price 7s. 6d.

This book is the second edition of one published some five years ago. The author stated in his preface to the first edition that an effort had been made to preserve the practical aspect throughout and that he had specially in mind the requirements of the amateur experimenter. These objects he has attained; the book is an eminently practical one for amateurs. Extensive revisions made in this edition include sections on television, photo-telegraphy and miscellaneous applications. New matter has been added on time delay circuits.

A few small criticisms occur to us. Considerable confusion exists with regard to the terminology used in connection with selenium. Since selenium may be used in the construction of both types of light-operated cells, we suggest that a better title for the book would have been "Photo-Electric Selenium Resistance Cells." The name of Shelford Bidwell, perhaps the greatest pioneer in the subject of selenium resistance cells, is incorrectly spelt, while in the footnote on page 61 dealing with the "bel," one might remark that it is hardly customary to give this unit a capital letter. The Westinghouse cell, it is stated, utilises cuprous oxide on copper. We, however, fail to find a similar statement as to the active material used in the Weston photronic photo cell. Is it a selenium or copper oxide type of cell? The experimenter would be glad to be told.

These are, however, but small blemishes in what, as we have already said, is a good book for awakening the interest of the amateur in the subject, and one which should spur him on to try the many devices outlined and perhaps to think out new schemes for himself.—J. T. M-M.

Fundamental Processes of Electrical Discharge in Gases. By LEONARD B. Loeb. Pp. 717; figs. 297. Chapman & Hall, Ltd.

This book presents a comprehensive study of a subject in which remarkable progress has been made and extensive knowledge gained during the past two decades, both in the purely scientific field and in the many important practical applications. The first and larger portion of the book deals with the fundamental behaviour of the ions and electrons of a gas. The remainder is devoted to the application of these primary processes to the mechanism of visual effects, namely the spark discharge, the glow and the arc.

The contents include ionic mobilities, ionic and electron recombination processes and diffusion of ions and electrons, electron mobility, energy distribution function of electrons in gases, electron attachment and negative-ion formation, conduction currents and the phenomena of ionisation with special reference to the work of Townshend Succeeding chapters give the theory of sparking together with essential technique to be adopted in its study, special types of breakdown and the mechanism and characteristic features of the glow and arc discharge.

Three appendices deal with the kinetic nature of a gas, critical potentials in volts and useful physical constants. Each chapter terminates with very comprehensive references and author and subject indices are appended at the end of the book. The aim has, in fact, been to correlate in a concise form all the most important of the vast experimental data accumulated over years in the study of conduction through gases. At the same time, while indicating that in many cases finality of opinion in relation to much of the matter is far from being reached, the author has utilised his great practical experience to state his own interpretations of certain phenomena and the reasons for his conclusions. He has thus produced a work which should be of the very greatest value to those engaged in the study of this subject in gases, not only in the realm of pure science, but also in the design of electrical apparatus directly associated with the behaviour of gases in the electrical field.—P. M. H.

Industrial Plastics. By H. R. Simonds. Pp. 371; figs. 132. Sir Isaac Pitman & Sons, Ltd. Price 22s. 6d.

This book is written in simple language, with a first chapter given to definitions and a quick introduction to the subject as a whole. The author avoids tediously detailed chemical studies, evidently being more interested in plastics as engineering materials than most writers on this subject.

The text and many of the illustrations, which have been carefully prepared, reveal the assistance received by the author from America, with which country he has university associations. His primary endeavour has been to provide a source of information for users seeking fresh suggestions in moulding practice, rather than to challenge the older materials. The book will serve, too, as a background text for students, covering composition, physical properties, fabrication, design and application.

A list of industrial uses of plastic materials suggests that the electrical and radio industries are the second and third most important markets for moulded products. A most useful last chapter consists of a trade names and type identification index.—W. O. F.

Shorter Notices

"Studies in Apprenticeship." By W. S. Trobe, G. E. M. Keys and A. A. Kirk. Pp. 88. Published by the New Zealand Council for Educational Research and obtainable in this country from the Oxford University Press, Amen House, Warwick Square, E.C.4. Price 4s.

"Practical Electrical Metering." By M. F. Smalley and six other members of the staff of the Ohio Power Co. Pp. 228; figs. 226. Chapman & Hall, Ltd. Price 16s. 6d.

"The Early Days of the Power Station Industry." By R. H. Parsons. Pp. 217; 29 plates and figs. Cambridge University Press, Bentley House, 200, Euston Road, N.W.1. Price 15s.

"Calculation of Fault Currents in Electrical Networks: Circuit Breaker Selection." By R. T. Lythall. Pp. 69; figs. 86. Sir Isaac Pitman & Sons, Ltd. Price 8s. 6d.

"Wireless Service Manual." By W. T. Cocking, of the *Wireless World*. Fifth (revised edition). Pp. 288; figs. Iliffe & Sons Ltd., Dorset House, Stamford Street, S.E.1. Price 5s.—Further revision of this widely used book renders it more than ever indispensable in the now highly specialised profession of the radio service engineer

"How to Work Sheet Metal." By H. J. Dyer. "Capstan and Turret Lathes," by E. T. Westbury; and "Pattern Making," by T. Spedding. Percival Marshall & Co., Ltd., 60, Kingsway, W.C.2. Prices, 2s. 6d., 2s., and 1s. 6d. respectively.

"Practical Electricity." By Terrell Croft. Revised by George H. Hall. Fourth edition. Pp. 701; figs. 599. Price 20s. "Electric Distribution Fundamentals." By Frank Sanford. Pp. 242; figs. 156. "Fundamental Principles of Electric and Magnetic Circuits." By Fred Alan Fish. Third edition. Pp. 228; figs. 133. Price 20s. "Principles of Television Engineering." By Donald G. Fink. Pp. 541; figs. 311. Price 33s. McGraw-Hill Publsihing Co., Ltd.

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Glass-insulated Cables

FLEXIBLE wires in sizes of 0.01 to 0.08 in., insulated with pure glass, have recently been announced under the registered trade name of "Lewcoglass" by the LONDON ELECTRIC WIRE CO. AND SMITHS, LTD., Church Road, Leyton.

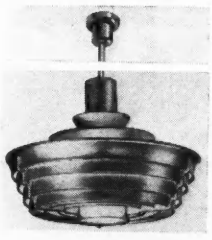
A different form of glass insulation for larger-sized cables, crushed to a powdered state by an elongation process that might be employed for similar application of a refractory insulating material, is proposed by BRITISH INSULATED CABLES, LTD., Prescot, Lancs. A copper rod core is inserted in a glass tube so that both will slide together into a copper tube. This concentric assembly is then reduced in diameter by drawing down, or rolling, accompanied by annealing between successive stages of elongation. For ordinary distribution cables adherence between the glass and metal is not necessary, provided that both core rod and enclosing tube are of copper.

Should a large radial thickness of glass be needed, the initial assembly would preferably consist of two or more co-axial glass tubes fitting together. It is advantageous, but not essential, to heat the assembly and then to chill it rapidly before commencing the drawing-down operations. Temperatures between 450 and 650 deg. C. suffice both for annealing the copper and for causing the glass to crack throughout, thereby easing the early stages of the elongation operation during which the glass is reduced to powder. Contamination by oxidation of the metal is avoided by annealing in an inert atmosphere, at the same time keeping the spaces between the glass and the copper core and tube filled, say, with nitrogen or carbon dioxide gas.

Decorative Fittings for Wartime

Two lighting fittings appropriate in wartime are offered by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. One of them is an all-metal pendant free from glass and so less liable to be damaged by shock due to air raids. It is also of light weight, easily dismantled and compactly packed for export trade, and is primarily intended for offices, &c.

Six concentric spun louvres are suspended in a three-way decorative bracket; maximum intensity is obtained immediately underneath by specially shaping the louvres to utilise the light normally shed in the horizontal direction. Owing to this distribution and to the fact that no glass whatever is used in its construction, specular reflection from glossy papers lying on desks is minimised.



G.E.C. all-metal office pendant

The fitting itself has extremely low surface brightness, is finished in sprayed silver cellulose and is equipped with an e.s. porcelain holder to take one 150/200 W pearl lamp. By the omission of the swing ceiling plate and downrod it can be converted from a pendant into a ceiling fitting.

The other is an inexpensive inverted fitting for quick attachment to any existing flexible cord pendant in small rooms when it is desired to replace an ordinary shade by a more decorative type. The chromium plated carrier with a glass bowl, 11 in. in diameter, is available in white, pink or champagne colour with silver line decoration, for one 60-, 75- or 100-W lamp.

Improved Measuring Instruments

An improvement in measuring instruments of the AC moving-iron type, which enables their angle of deflection to be enlarged, even beyond 360 degrees, is due to Mr. G. F. Shotter in conjunction with ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, S.E.13.

Four coils are so mounted that the axes of the two pairs, one pair within the other, intersect at right angles. A ring of laminated iron stampings affords the return path for the magnetic fluxes created by the currents passing through the coils. Each pair of the latter are in series, one set being connected to a terminal through a resistance, while the corresponding end of the other set is connected to the same terminal through an inductance or capacity. When AC is applied the current in one pair of coils is out of phase with that in the other; thus the respective fluxes are out of phase and, moreover, displaced in space by 90 degrees.

Weatherproof "Pharos" telephone

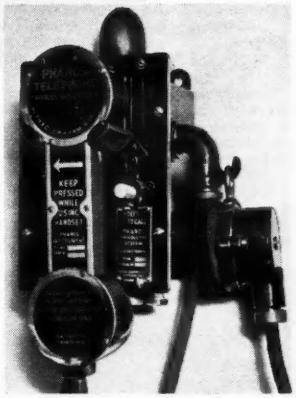
Consequently, considered separately, each flux tends to magnetise the flat disc (enclosed by the coils for rotating the pointer spindle) along the axes of that flux, but due to the hysteretic effect of the steel disc the intensity of magnetisation lags behind the flux. When one flux has died away to zero the other has reached its maximum value, assuming 90 degrees flux displacement. But the disc remains partly magnetised along the axes of the first flux, consequently tending to rotate the axes of the remanent magnetism into coincidence with the axes of the second flux. As the latter decays to zero the first flux is growing up to its negative maximum, thus continuing the tendency for rotation.

Intercommunication Telephone

Most of the facilities usually provided by intercommunication telephones, ordinarily necessitating three or four circuit wires, are obtainable with only two conductors between instruments of the "Pharos Twinductor" design announced by ALFRED GRAHAM & CO., LTD., Caxton House (East), Tothill Street, Westminster, London, S.W.1. They can be added wherever electric bells have already been installed, needing no further wiring.

One central battery of 12-16 V suffices for a number of telephones, which may be grouped for code calling, so providing a cheap multi-way installation without switching indicators or any line fittings.

First cost and maintenance are low; volume and articulation are both good, while special precautions have been taken to avoid blasting when the instrument is shouted into in noisy situations or in ships.



The telephones are considerably lighter and smaller than the usual marine type and are fully weatherproof. Interior components are mounted on an insulating board which is removable for ease of maintenance. The fabricated steel casing is hot-tinned and black enamelled, arranged for bulkhead or pedestal mounting, with four glands and terminals for an extension bell. Depression of the calling key-switch actuates both a hooter and signal lamp, the latter under a domed glass on top of the instrument so that it is readily visible from all angles, hence the name "Pharos." A lamp-dimming hood is available for use in navigational positions in ships.

The combination hand set is a one-piece moulding, shock-proof de la Rue compound or metal alloy, with a convenient thumb-press switch that permits the use of a fixed stowage clip. This prevents reception of the calling signal being interferred with by careless replacement of the hand set, which remains stationary in ships when they are rolling and pitching.

Canadian Apparatus Approval

WE reported recently that the Canadian Electrical Code (Part 1) had been adopted by the Provincial Governments, and in consequence the use of "approved" equipment is now required throughout the Dominion. The term "approved" means that the equipment has been submitted for examination and test to the Canadian Engineering Standards Association and has been given formal approval as complying with the C.E.S.A. standards.

Electrical equipment is defined as any equipment, machinery, apparatus, appliances, instruments, devices, fittings or materials designed for, used in, or intended to be used in the generation, transformation, transmission, distribution, supply or utilisation of electric energy.

Examination of electrical equipment takes place in laboratories authorised by the C.E.S.A. to examine and test such equipment. These laboratories issue reports to the Association which issues approvals based upon them. The principal authorised laboratories are those of the National Research Council, Ottawa, and the Hydro-Electric Power Commission of Ontario. Arrangements have also been made with the Underwriters' Laboratories in the United States to test certain types of equipment made in Canada in respect of which facilities for testing are not yet available in Canada, and there is an arrangement with the Testing Station of the Mines Department, Dean Stanley Street, London, S.W.1, for the testing of flameproof enclosures for electrical apparatus. So far it has not been possible to arrange for the testing of electrical apparatus generally in the United Kingdom, although the desirability is fully appreciated.

Approval, as at present carried out, is in general restricted to such equipment as is, or is likely to be, used by the general public in domestic, commercial and industrial installations. It includes, for example, wire and cable, fuses, switches, lighting equipment, small motors, self-contained motor-driven tools and appliances, heaters, signs, bell-ringing transformers, &c. Large motors, transformers, switchgear and the like, which are to be in charge of persons having some technical knowledge, are not being dealt with by the C.E.S.A. except where approval is required by a Provincial inspection department.

Information regarding the procedure for the obtaining of approval, fees, &c., is obtainable from the Secretary, Canadian Engineering Standards Association, National Research Building, Ottawa. In the case of flameproof enclosures inquiries should be addressed to the Mines Department Testing Station. Copies of the National Code (Part 1) are obtainable on loan for a short time from the Department of Overseas Trade, Great George Street, London, S.W.1, or may be purchased from the Secretary of the C.E.S.A. at 50 cents per copy.

COMMERCIAL and INDUSTRIAL NEWS

E.T.U. Conference. I.H.V.E. Competition. Institute of Air Conditioning.

The E.T.U.'s Progress

SPEAKING at the conference of the Electrical Trades Union at Morecambe on Monday last, the general president, Mr. E. W. Bussey, said that since the initiation of the reorganisation scheme six years ago the Union had never looked back. The membership had risen from 34,000 to 75,000, and the funds from £35,500 to £220,000. While the number of area officials was greater, there had been no increase in the headquarters staff.

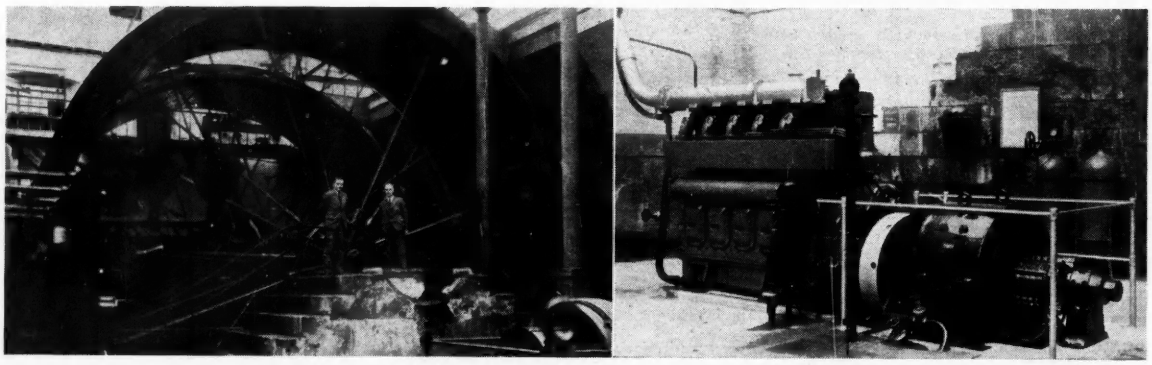
Referring to the situation caused by the war, Mr. Bussey said that the whole of the great trade union movement had been placed at the service of the State. They had made no bargain with the Government or the employers. These were not the days for bargaining; the primary duty of all was service. He then went on to recount the arrangements which had been made with regard to wages in the contracting and supply sections of the electrical industry, particulars of which we have already given. Adjustments in the wages of members employed by the railways had also been secured. The dispute in the cinema industry had resulted in a loss of membership in that section, but the president hoped that they would be regained.

He paid tribute to Mr. Ernest Bevin for the way in which he had handled the problem of transference of labour to shipyards. They had attempted to secure a remedy for the state of affairs resulting from the failure to use the skill of men taken for the armed forces, and had advocated their return to civil life if they could not be properly employed. Over 3,000 members were serving and more were going weekly. Mr. Bussey concluded by referring to the revisions of rules before the conference, many of which, he said, were far-reaching in their intentions and affected the vital structure of the Union.

Ancient and Modern Mill Drive

In 1832 James Finlay & Co., Ltd., Doune, Perthshire, installed four huge water wheels in their linen factory for driving the mill machinery. These have been in continuous use ever since, and the service they have given without need for any repairs for more than 100 years provides evidence of the skill of the Scottish engineers of that period. Each wheel is 36ft. in diameter and develops 75 HP at 2 RPM, the source of power being water taken from the River Teith. The wheels are arranged in double tandem driving the main mill shaft through massive gears.

The power plant at the mill has been extended from time to time by the addition of electric generators, the most recent of which comprises a Bruce Peebles 165-kW generator driven by a Mirrlees, Bickerton & Day Diesel engine. Although the power of this new generating set is more than equal to the combined power of two water wheels, it occupies only a small fraction of the floor space taken up by the wheels and serves to illustrate the great advance that has been made in power application.



The linen factory of James Finlay & Co., Ltd., Doune, showing two of the four water wheels installed in 1832 and the Bruce Peebles generator and Mirrlees Bickerton & Day Diesel recently installed

Preventing Industrial Stoppages

An Order in Council under the Emergency Powers (Defence) General Regulations, with a view to preventing work being interrupted by trade disputes, empowers the Minister of Labour to establish a tribunal for their settlement; to prohibit, subject to the provisions of the Order, a strike or lock-out in connection with any dispute; and to require employers to observe such terms and conditions of employment as may be determined in accordance with the Order to be, or to be not less favourable than the recognised terms and conditions. Power to refer disputes to the Industrial Court will not be affected. Power is also given to amend directions under Acts relating to holidays with pay. The Minister has power to postpone the times or extend the period at or within which the holidays are to be allowed.

I.H.V.E. Competition

The Institution of Heating and Ventilating Engineers has announced particulars of its competition, which is now open also to non-members of the Institution, whereby premiums up to £10 10s. will be awarded for papers which the Council considers of sufficient merit for publication in its monthly *Journal*. In addition to gaining a premium, all papers submitted for the competition are eligible for the silver and bronze medals of the Institution. Particulars of the competition, together with a list of suggested subjects can be obtained on applicaton to the Secretary, 22, Russell Square, London, W.C.1.

Evacuation Provisions

The Minister of Home Security has made the Defence (Evacuated Areas) Regulations, 1940, which says, *inter alia*, that no sum payable by occupants of evacuated premises under any contract for the supply of water, gas, electricity or telephone services shall be recoverable during the evacuation period. The reliefs will not apply to rent or money payable under a contract entered into after the date of the Regulations, nor to payments for the hire or hire-purchase of goods unless the goods or some part of them were in the area at the beginning of the evacuation period and they have not been removed from the area before the date on which the sum was due.

A court has power to remove or modify the reliefs granted by the Order if it is satisfied that a person entitled to possession of unoccupied premises has at any time lived in the area since the beginning of the evacuation period. It may also do so if the person liable, or anyone else with his consent, has been enjoying a substantial benefit from the premises or goods.

Fire Damages Wholesalers' Premises

Hirst, Ibbetson and Taylor, Ltd., announce that a disastrous fire broke out on their premises on July 11th which has caused considerable disorganisation. The chief damage was in the accounts department, which was gutted. Temporary offices have been established at 47, Chapel Street, Salford, 3, and arrangements have been made for the business to be carried on as usual. The company assures customers that everything possible will be done to minimise delay in delivery of goods or in correspondence, and it is anticipated that business will be back to normal in a very short time.

Canteens in Industry

The third edition of "Canteens in Industry" issued by the Industrial Welfare Society, is particularly opportune when the provision of communal feeding facilities has been brought to the fore by the work of the new Factory and Welfare Advisory Board of the Ministry of Labour. Many additions have been made to the new edition and special attention has been given to the problems raised by rationing, by the need to provide meals for both day and night shifts, and the difficulties of giving quick service of hot meals and refreshments in large and scattered factories. The booklet contains useful information on the planning and equipment of premises and the management of canteens when they have been established. Copies can be obtained from the secretary of the Society, 14, Hobart Place, Westminster, London, S.W.1, price 1s., or 1s. 2d. post free.

Australian Electrical Imports

In the total value of the imports into Australia during the first six months of the trading year 1939-40 of electrical machinery and apparatus there was a decline to £1,950,000 compared with £2,431,000 in the corresponding period of the preceding year. The leading item was cable and wire, £582,730 (against £600,000), with dynamo-electric machines, £382,600 (£440,146); telegraph instruments, telephones and telephone switchboards, £321,000 (£512,000); filament lamps, £77,600 (£91,880); batteries and accumulators, £33,440 (£20,860); and unspecified items, £552,000 (£767,000).

Diamond Cutting in Birmingham

Diamond cutting and grinding have for many years been the monopoly of Amsterdam, but the invasion of Holland by Germany has brought about a cessation of this trade. It is interesting to learn, therefore, that Mr. J. C. Ginder, a diamond merchant, has opened a new diamond-cutting workshop in Birmingham. He has been able to obtain machinery from the Continent to provide patterns for English manufacturers to copy and Crompton Parkinson, Ltd., have been able to carry out in a very short time a substantial order for the necessary motors. The factory, which will employ about a hundred people, is now in production.

"Rotax" Tools

Following negotiations with Acton Electric Tools, Ltd., the sales and service arrangements of "Rotax" universal and high-frequency electric tools have been taken over by S. Wolf & Co., Ltd., of Pioneer Works, Hanger Lane, Ealing, W.5. All "Rotax" electric tools which require repairs should be returned direct to S. Wolf & Co., Ltd., to whom

orders for spare parts should also be sent. The manufacture of the high-frequency tools will in due course be undertaken at Pioneer Works, and so far as the existing types of "Rotax" universal tools are concerned, these will be merged in the range of "Wolf" electric tools.

Institute of Air Conditioning Engineers

The Institute of Air Conditioning Engineers has been registered as a company limited by guarantee without share capital. The original number of members is 500, each member being liable for £1 in the event of winding up. Its objects are: To develop and improve the practice and system of air-conditioning; to print and publish papers, circulars, periodicals in connection therewith, &c. The subscribers (each with one share) are S. E. Weber-Brown, 1c, King Street, St. James's, London, S.W.1; Jean M. Bray, 42, Waverley Crescent, Plumstead Common, S.E.18, and five others. The management is vested in a Council, the first members of which are to be appointed by the subscribers. The solicitors are Oliver Richards and Parker, 14, Sunte Close, Haywards Heath.

"Electrical Review" Index

The index to Vol. CXXVI of the ELECTRICAL REVIEW, covering the first half of this year is now available, and readers desiring copies for binding purposes can obtain them from the Publishing Dept., Dorset House, Stamford Street, S.E.1.

Employment of Aliens

The Minister for Home Security has made the Alien Employment Order which provides that no alien shall enter into, or continue in, certain classes of employment unless he has the Minister's permission. Aliens already in such employment who apply for permission to continue in it before July 20th may remain in the employment pending the determination of their applications. The schedule includes employment in any prohibited place; in armament factories; in gas, water and electricity undertakings; and with any radio, telegraph or telephone company engaged in the transmission of naval, military or Air Force messages.

Professional Classes Aid Council

With the outbreak of war the Professional Classes Aid Council decided that for a time no fresh commitments could be undertaken, the current commitments, particularly for education and maintenance grants, being heavy and the future uncertain. As the result of steady and generous support of contributors it resumed its normal activities in December.

In its report for 1939-40 the Council states that financial aid and help in kind was given in 332 cases, and in addition 391 were advised of suitable sources to approach for help, as were many of the 232 whose applications were outside the scope of the Council's work. The accounts for the year record a total income of £15,026 and an expenditure of £14,322, leaving a balance of £704.

Bengal Power Station Lighting

The Mulajore power station of the Calcutta Electric Supply Corporation, Ltd., which was opened in January this year, has a capacity of 60,000 kW, which will shortly be increased to 90,000 kW, provision having been made for further increments up to 400,000 kW. British manufacturers played a large part in its construction, and the lighting equipment was supplied by the General Electric Co. (India), Ltd., using G.E.C. fittings and "Osram" lamps. In the turbine hall, specially designed angle fittings have been installed similar to those supplied to the Barking power station. Each carries a 500-W "Osram" lamp, the illumination being of the order of 5 ft.-candles. Other reflectors have been installed elsewhere in the turbine hall and also in the annexes.

In the control room diffused lighting was specified to avoid glaring light sources and shadows. Concealed lighting was accordingly installed along the beams and consisted of 360 ft. of special trough reflectors with 25-W lamps spaced 6 in. apart, the total load being 18 kW. For the general office an intensity of 5 ft.-candles is provided by 14-in. diameter pendants with enclosed diffusing opal bowls and 200-W lamps. In the cable rooms and cable passages in the office block there are special prismatic glass bulkhead fittings which give a light distribution through 180 degrees when fitted to a wall or ceiling.

The general scheme of lighting in the switch room and in the transformer houses is provided by elliptical-angle reflectors mounted high upon the walls on either side. In the cable ducts prismatic-type bulkhead fittings are again used, and in the boiler house the firing floor is illuminated by 300-W parabolic angle-type reflectors fitted under the galleries. These give adequate illumination for all instruments and with the aid of 18-in. diameter dispersive-type reflectors with 300-W lamps, provide an illumination of 8 ft.-candles. The top of the boilers, fan floor, basement, &c., were provided with general lighting supplied chiefly by 200-W dispersive reflectors. The compound, foreshore, passages between buildings, roadways and other spaces are illuminated by long-range floodlights mounted high on top of the buildings and by short-range floodlights on the walls. The short-range units are fitted with 500- or 1,000-W lamps. All the wiring was carried out in G.E.C. "Silverlac" heavy-gauge welded steel conduit and Pirelli-General v.i.r. cables. Mr. J. Parkinson, chief engineer to the Calcutta Electricity Supply Corporation, supervised the installation, assisted by Mr. W. C. Ash, consultant civil engineer.

Aluminium Collections

Following the appeal to housewives to help in aircraft production by handing over surplus aluminium kitchenware Blackburn Corporation Electricity Department has opened its showroom as a special collecting depôt. Several tons of new and old ware of every type have been received. The electricity showroom staff has arranged an amusing figure of "Peter Pan" constructed in saucepans, frying pans, new pans and battered old ones. The accompanying picture shows a section of the large stock contributed within forty-eight hours.

Hull Corporation Electricity Department is also co-operating with the authorities in the drive for collecting aluminium scrap, and at the direction of Mr. D. Bellamy, general manager of the electricity undertaking, all the aluminium deflector plates in stock—about 4 cwt.—have been handed over. In addition, authorisation has been given to consumers who have electric cookers with deflector plates to surrender the plates for the salvage scheme. Mr. Bellamy estimates that if all consumers hand over these plates this will realise three tons of aluminium in the city. All the Department's depôts are being used as receiving offices, and drivers of its vehicles are authorised to accept aluminium ware from housewives.

Aluminium-ware surrendered by Blackburn housewives at the showroom of the Corporation Electricity Department

Fatality

An inquest was held at Brentford on July 15th on Francis Benjamin Smith (29), meter superintendent with the Brentford and Chiswick Corporation Electricity Department, who was killed by electric shock at his home. It was stated that he had been carrying out wiring operations without authority, and apparently disconnected the seal on the electricity meter, coming into contact with the terminals. A verdict of "Death from misadventure" was returned.

New Transformer Company

The British Electric Resistance Co., Ltd., informs us that it has been found necessary to build a works adjacent to the existing factory for the manufacture of transformers up to 500 kVA. To handle this branch of the business a new company, British Power Transformer Co., Ltd., has been formed, and from August 1st all correspondence regarding sales, manufacture, &c., relating to transformers should be addressed to this company at Queensway, Ponders End, Middlesex.

Change of Address

The Southern Areas Electric Corporation, Ltd., has now returned to its London address, Palace Chambers, Bridge Street, Westminster, London, S.W.1, and has closed its evacuation address at Crawley, Sussex.

Trade Announcements

Standard Telephones and Cables, Ltd., announce that they have opened a branch office at Temple Court, Temple Row, Birmingham, 2, which will be under the management of its local representative, Mr. J. Gilmour.

The Warm-Glow Co. has removed to Queen Anne's Close, Chapel-en-le-Frith, via Stockport.

Price of Materials

The following changes in the prices of materials have taken place since July 3rd:—

Henry Gardner & Co., Ltd., report July 17th: English block tin, £265, £2 5s. increase.

Edward Till & Co., report July 17th: India rubber, Para fine 1s. 2½d., ¾d. decrease.

New Catalogues and Lists

Runbaken Electrical Products, Burton's Building, 71-73a, Oxford Road, Manchester, 1.—An illustrated and priced list of ignition components and spare parts, &c.

Simplex Electric Co., Ltd., Broadwell Road, Oldbury, Birmingham.—Leaflet No. P.R.6, showing advances which have been made in the prices in current price lists.

Aluminium Union, Ltd., The Adelphi, Strand, London, W.C.2.—The eighth of the series of "Aluminium Technique," dealing with the importance of sodium in aluminium-silicon alloys.

Synchromatic Time Recording Co., Ltd., 65, Erskine Street, Liverpool, 6.—A circular letter drawing attention to A.R.P. equipment supplied by the company. Also leaflet W.1, illustrating and describing the "Synchromatic Perpetual" watchman's control clock.

Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2.—A leaflet describing the Babcock fuel sampler, for use in the accurate reduction of coal and other crushed and powdered samples for analysis.

Hellermann Electric, Ltd. — In our issue of July 5th the address of this company was incorrectly given as Novatric Works. This should, of course, have read Goodtric Works.

B.E.N. Patents, Ltd., Hughenden Avenue, High Wycombe, Bucks.—The company's latest edition of its compressed-air equipment catalogue is a comprehensive and fully illustrated list of air line fittings, air valves and compressed air accessories of every kind. Many new products are included in the B.E.N. range and others are now issued in an improved form.

Westinghouse Brake & Signal Co., Ltd., 82, York Way, King's Cross, London, N.1.—An illustrated brochure describing metal rectifier chargers for electric vehicle truck and hand-barrow batteries. Also a leaflet relating to the company's static phase convertor.

The Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, London, N.17.—No. 1, Vol. 40 of "The Reflector," illustrating some typical examples of industrial lighting installations employing Benjamin reflectors.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

SUB VITA (Wartburg Lamps, Ltd.) flashlamps.

Battery-operated razor.

ELECTRICITY SUPPLY

Increased Profits at Bath and Cannock. Coal Problem at Dumfries.

Barrow-in-Furness.—PRICE PROSPECTS.—In his annual report for the year ended March last Mr. J. E. Shepherd, the borough electrical engineer, states that provided no material advances take place in the cost of coal, stores, wages and salaries he considers that the undertaking may go through another financial year without altering its scale of charges.

Bath.—NET PROFIT GROWS.—It was reported to the Electricity Committee last week that there was a net profit on the undertaking for the past year of £27,011, compared with £10,263 in the previous year. After deducting £11,282 capital expenditure charged to revenue and adding £1,330 brought forward from 1938-39 there was a disposable balance in hand of £17,059.

Burton-on-Trent.—FRINGE ORDER.—The Electricity Committee has obtained a Fringe Order for the supply of electricity to premises in the parish of Newborough.

Cannock.—NO INCREASE CONTEMPLATED.—Revealing a record net surplus on the working of the undertaking (£7,713) Mr. P. Wardle, the chief engineer and general manager, states in his annual report that he does not consider it necessary at present to contemplate any war increase in charges.

Darwen.—EFFORT TO KEEP CHARGES DOWN.—Like Barrow and Cannock, Darwen Electricity Department is trying to keep charges down, although here there is a drop in the profit for the year. Recording a net profit of £2,455 (against £4,909), which is considered satisfactory under prevailing conditions, the Department's annual trading report states that every effort is being made to avoid increasing charges.

Dumfries.—STANDARD COAL PRICE?—At the last meeting of the County Council the convener said that the question of coal supply for the electricity undertaking might well be taken up with the Government. He thought there should be a flat rate for coal for such undertakings throughout the whole of Great Britain. He was afraid that if this were not done consumers would be faced with exorbitant prices.

LARGE INCREASE IN SALES.—There was an increase of about 22 per cent. in kWh sold during the past year, the output being 14.5 million kWh. After payment of all working expenses and interest charges, £25,938 has been allocated to loan repayment, £4,500 more than was anticipated. Net capital expenditure is now £519,813, of which £115,001 has already been repaid. At the end of the year there were 9,502 consumers, including 669 farms.

Gateshead.—SUPPLY TO HOSPITALS.—The Town Council is to take a supply of electricity from the North-Eastern Electric Supply Co., Ltd., for the Sheriff Hill Hospital and the Infectious Diseases Hospital. The Council will erect the necessary substation and the Company will install the apparatus. The Council will contribute about £900 towards the cost. The charge for energy will be £4 5s. net per kW per annum, plus 0.5d. per kWh for the first 120,000 kWh per annum and 0.4d. per kWh thereafter.

Glasgow.—ELECTRICITY FROM REFUSE.—Mr. Colin H. MacFarlane, Glasgow's director of cleansing, disclosed in a broadcast recently that the Corporation destructors, burning 500 tons of rubbish in a day, will produce 150,000 kWh.

Heywood.—RESULT OF YEAR'S WORKING.—The Electricity Committee reports a surplus of £3,132 compared with a balance of £5,752 a year ago.

Newcastle-on-Tyne.—OPTION TO PURCHASE UNDERTAKING.—The City Parliamentary Committee has decided that in view of the war the Council's option to purchase the undertakings in the city area of the North-Eastern Electric Supply Co., Ltd., and the Newcastle and District Electric Lighting Co., Ltd., should be extended until July 3rd, 1942. The option was due to expire on July 3rd this year.

Northern Ireland.—INQUIRY INTO PRICE INCREASE.—An inquiry was recently held by Mr. F. Westlake Parkinson, M.I.E.E. (for the Ministry of Commerce) into an application by the Ballycastle Electricity Co. for authority for a maximum increase of 50 per cent. in its charges. Mr. Dobbin (managing director) said that it was the company's intention to increase the private consumption rate by only 2d. and the power rate by ½d., but it wished to be safeguarded against any contingency that might arise during the next three years. The present charges are 10d. and 3d.

Paisley.—STREET LIGHTING PLANS.—The Watching and Lighting Committee has authorised the chief constable to proceed with the installation of 1,887 lamps and fittings to cost £1,500, plus a maintenance charge of £1 per lamp per annum, for side-street lighting.

Petersfield.—PRICE INCREASE.—It was reported to the R.D.C. recently that the Mid-Southern Utility Co. had announced that electricity charges were being increased by 10 per cent. as from the midsummer meter readings.

Portsmouth.—FORMER EMPLOYEES' COMPENSATION.—The Electricity Committee has approved compensation and costs to ex-employees of the Gosport electricity undertaking totalling £6,540.

Scarborough.—HIRE AND HIRE-PURCHASE RESTRICTED.—The Town Council has reconsidered its regulations regarding the sale and hire of electrical appliances and installations during the war, and has decided that no new cookers will be issued for the period of the war. Reconditioned cookers will be hired where the wiring is already installed or where the consumer will provide the wiring at his own expense. The hire of water heaters is to be suspended, but they will be supplied on hire-purchase (as far as stocks allow) over a period of five years. The hire of reconditioned wash boilers is to continue as far as stocks allow. Assisted wiring is to be suspended.

Shoreham. — PRICE ADVANCE. — The Shoreham and District Electric Lighting and Power Co. announces increases in charges. Apart from lighting and domestic power there will be an addition of 5 per cent. to the kWh rate. The lighting flat rate is being raised from 6d. to 7d., and domestic power from 1d./2d. to 1¼d./2½d., with corresponding advances for prepayment meter supplies. Quarterly minimum charges under the domestic "all-in" and "all-electric" tariffs are being raised, and the number of kWh supplied free of charge under the "all-in" shop tariff will be reduced.

Southport.—POSTPONEMENT OF OPTION.—Application is to be made for an Order under the Special Enactments (Extension of Time) Act, 1940, to provide for the postponement for three years from August 12th of the time within which the power of the Corporation to acquire the undertaking of the Birkdale District Electric Supply Co., Ltd., may be exercised.

Torquay. — DEARER ELECTRICITY. — At the last meeting of the Town Council a recommendation for a 12½ per cent. increase in electricity charges was approved after an amendment for its reference back had been defeated by 13 votes to 9. A similar increase was made in 1938.

West Hartlepool.—NO INCREASE IN CHARGES.—In presenting the accounts of the electricity undertaking recently, the chairman of the Electricity Committee (Councillor Marcus Bloom) said that the very low charges were being retained, which was a great achievement. It was reported that there was a surplus on the past year's working of £1,028, which it was agreed to carry forward, making a balance in hand of £3,100.

Whitby. — PUBLIC LIGHTING. — The Rural District Council has sealed an agreement with the North-Eastern Electric Supply Co., Ltd., for public lighting at Staithes.

Wimbledon. — VEHICLE BATTERY CHARGING.—The Electricity Committee has increased the tariff for vehicle battery charging and for road traffic signs from ¾d. to 1d. per kWh.

LOAN FOR WIRING INSTALLATIONS.—Sanction has been obtained to borrow £5,681 for wiring installations.

Workington.—A.W.S. DISCONTINUED.—As many employees have left for national service, the Electricity Committee has discontinued the assisted wiring scheme.

Modified Street Lighting

THE July *I.M.E.A. Journal* states that the Ministry of Home Security is anxious that local authorities shall proceed at once with the installation of modified street lighting if they intend to provide it. Permission to install the new system was given towards the end of last year, and manufacturers found themselves unable to cope with the rush of orders. Now, in view of the difficulty of obtaining materials, it is necessary that orders for the fittings should be placed at once. Manufacturers are at present able to deal with orders whereas if they are left until August or September congestion will again arise.

Information received from local authorities throughout the country shows that at least 50,000 fittings have already been ordered. Nearly 200 lighting authorities have adopted the system and a further 250 have indicated that new installations or extensions are likely in the coming autumn.

Attention is drawn to the fact that only fittings complying with B.S.S./A.R.P.37, and certified by the British Standards Institution, may be installed.

TRANSPORT

Ashton-under-Lyne. — NEW TROLLEYBUSES.—Eight new trolley-buses of which the Corporation is taking delivery are to run in conjunction with the Manchester Corporation on the Piccadilly, Ashton, Stalybridge, and the Piccadilly, Audenshaw and Ashton routes. They are Crossley two-axle types of the latest design.

Blackpool.—TRAMS GIVE BETTER SERVICE.—Mr. Walter Luff, transport manager, reports that since war broke out the Blackpool trams have carried about 50,000,000 people. If this section of the system had been covered by buses it would only have been possible to have run 70 per cent. of the normal peacetime service.

Manchester.—TRANSPORT OPERATIONS. The Corporation has reduced its stock of electric tramcars to 420, and on the operations of the year to March 31st last they incurred a deficit of £115,401. This is the result of the wholesale conversions to motor-bus and trolley-bus working. Receipts per tramcar mile are stated to be 16.031d., and total expenses, including capital and net revenue charges 19.515d. (compared with 15.772d. in 1937). The price paid to the Electricity Dept. for electrical energy was less than in the previous year—0.744d. against 0.762d. Corresponding figures for the motor buses are: Receipts per mile, 15.475d.; expenses, 14.053d. Trolley-buses in service number 91, and they appear to be operated on a very profitable basis. Receipts per mile were 18.518d.; working expenses, 12.684d.; and capital charges and renewals, 3.326d., making the total expenses 16.010d. per mile. Electrical energy consumed by the tramway system was 21,540,115 kWh (2.710 kWh per car mile; 7,949,625 car miles), and by the trolley-buses 6,372, 590 kWh (2.741 kWh per vehicle mile; 2,325,067 vehicle miles). Trams travelled an average of 67 miles per day, and trolley-buses 89.

Italian Plant Damaged

Reuter reports that considerable damage was done when a dam burst following the overflowing of the River Dora Baltea, near the important Italian electrical centre at Aosta, 50 miles north-west of Turin. There were seven casualties.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1937

35762. "Fluorescent materials." Baird Television, Ltd., and C. S. Szegho. December 14th, 1938. (522465.)

1938

10446. "Temperature-control devices for electric irons or the like." F. Reingruber and J. Reingruber. May 5th, 1938. (522466.)

26632. "Electric switchgear." Brown, Boveri & Cie Akt. Ges. September 10th, 1937. (522514.)

29303. "Electric selector switches." Standard Telephones & Cables, Ltd., B. B. Grace and C. P. Smith. October 10th, 1938. (Cognate application 37037/38.) (522467.)

29462. "Printing-telegraph apparatus." Creed & Co., Ltd., A. E. Thompson, and R. D. Salmon. October 11th, 1938. (522468.)

32450. "Electric remote-control systems employing resonance relays." G. L. Woolnough, R. M. A. Smith, D. R. Price, and Metropolitan-Vickers Electrical Co., Ltd. November 8th, 1938. (Cognate application 4476/39.) (522419.)

32539. "Electric power systems comprising two or more separately driven alternators which are required to run in synchronism." B. P. Verel. November 9th, 1938. (522474.)

32640. "Iron-cored coils." W. S. Challis. November 10th, 1938. (522420.)

32834. "Electric theft-alarms." J. C. Brown and H. B. Brown. November 11th, 1938. (522423.)

32977. "Variable-capacity arrangements." Marconi's Wireless Telegraph Co., Ltd., N. M. Rust, J. D. Brailsford, A. L. Oliver and J. F. Ramsay. November 12th, 1938. (522476.)

32978. "Fixed-plate variable capacity condenser." Marconi's Wireless Telegraph Co., Ltd., G. F. Brett and N. Levin. November 12th, 1938. (522477.)

33119. "Alternating-current voltage regulators." J. B. Hansell and Metropolitan-Vickers Electrical Co., Ltd. November 14th, 1938. (522479.)

35650. "Electric hot-plates." Revo Electric Co., Ltd., F. H. Reeves and A. N. Harding. December 7th, 1938. (522427.)

35800. "Means for the method of producing a sub-multiple wave from a high-frequency wave." Wired Radio, Inc. January 14th, 1938. (522428.)

35801. "Carrier-wave signalling systems." Wired Radio, Inc. January 14th, 1938. (522429.)

35826. "Magnetic compasses." Sperry Products, Inc. January 21st, 1938. (522436.)

35843. "Apparatus for generating electric currents of saw-tooth wave forms." General Electric Co., Ltd., E. C. Cherry and R. J. Clayton. December 8th, 1938. (522443.)

35844. "Manufacture of vitreous envelopes, more particularly of cathode-ray tubes, through which pass leading-in wires." General Electric Co., Ltd., J. Richards and G. W. Warren. December 8th, 1938. (522444.)

35883. "Automatic machine for the fixing of snugs on electric-lamp and bulb bayonet caps, and other similar operations." J. Bardy. December 8th, 1938. (522522.)

35896. "Combined moulding and electrical wiring system." R. L. Davison. December 8th, 1938. (522454.)

35899. "Transformers." Ajax Electrothermic Corporation. December 11th, 1937. (522456.)

35900. "Systems of simultaneous telephony on a number of lines." M. Creti. December 8th, 1938. (522457.)

35943. "Controlling means for electrical heating elements." Jackson Electric Stove Co., Ltd., and T. J. Lattimer. December 9th, 1938. (522570.)

35947. "Electrolytic production of protective coatings on aluminium." J. Frasch. December 17th, 1937. (522571.)

35953. "Electric lamp standards." P. B. Roberts. December 9th, 1938. (522572.)

35969. "Arrangements for determining distance by means of radiated electromagnetic waves." Standard Telephones & Cables, Ltd. December 10th, 1937. (522574.)

35987. "Systems of electric motor control." British Thomson-Houston Co., Ltd. December 9th, 1937. (522582.)

35988. "Winding and the like systems." British Thomson-Houston Co., Ltd., H. W. C. Liddiard and T. H. Petch, jun. December 9th, 1938. (522583.)

36013. "Ceramic materials adapted to be sealed to glass." General Electric Co., Ltd., and J. R. Lait. December 9th, 1938. (522586.)

36052. "Electron-discharge devices." H. G. Lubszynski. December 10th, 1938. (522458.)

36080. "Production of longitudinally covered electrical conductors." Patentverwertungs Ges. Hermes. December 10th, 1937. (522593.)

36118. "Electrical control of tuning means for wireless receiving-apparatus." Telefunken Ges. für Drahtlose Telegraphie. December 11th, 1937. (522525.)

36163. "Telephone systems." Siemens Bros. & Co., Ltd., and P. A. Chittenden. December 12th, 1938. (522606.)

36165. "Luminescent materials and combinations therewith of sources of radiation adapted to excite the materials to luminescence." General Electric Company, Ltd., and A. H. McKeag. December 12th, 1938. (Addition to 495706.) (522607.)

36166. "Electric circuit-breakers having arc-extinguishing means." General Electric Company, Ltd., and C. J. O. Garrard. December 12th, 1938. (522608.)

36167. "Electric heating devices." General Electric Company, Ltd., and J. L. Rycroft. December 12th, 1938. (522609.)

36168. "Electric heating devices." General Electric Co., Ltd., and J. L. Rycroft. December 12th, 1938. (522610.)

36173. "Snap-action electric switches." Walsall Conduits, Ltd., and E. Gough. December 12th, 1938. (522612.)

36205. "Optical system having a linear source of light." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 15th, 1937. (522486.)

36263. "Apparatus for measuring the properties of liquids, the electrical conductivity of which varies with said properties." W. Crockatt & Sons, and W. C. Crockatt. December 13th, 1938. (522488.)

36325. "Cathode-ray tubes." Kolster-Brandes, Ltd., and C. N. Smyth. December 13th, 1938. (522533.)

36326. "Aerial systems for wireless communication." Standard Telephones & Cables, Ltd. (W. J. Polydoroff). December 13th, 1938. (522492.)

36327. "Ringers, such as may be used in telephone subsets." Standard Telephones & Cables, Ltd. (L. J. G. Nys and F. van Leathem). December 13th, 1938. (522493.)

36359. "Control circuit arrangements for electrical oscillation generators." Marconi's Wireless Telegraph Co., Ltd., C. E. Parkinson and D. L. Plaistowe. December 13th, 1938. (522495.)

36360. "Thermionic valves." Marconi's Wireless Telegraph Co., Ltd., and D. A. Bell. December 13th, 1938. (522496.)

36446. "Contact arrangements of electric switches." Oak Manufacturing Co. September 23rd, 1938. (522540.)

36468. "Automatic installation switches." Patentverwertungs Ges. Hermes. December 14th, 1937. (522541.)

36552. "Lighting fittings." General Electric Co., Ltd., and J. B. S. Smyth. December 15th, 1938. (522502.)

36553. "Apparatus for transmitting television." General Electric Co., Ltd., and D. C. Espley. December 15th, 1938. (Cognate application 29590/39.) (522545.)

36579. "Electric motor control systems." British Thomson-Houston Co., Ltd. December 15th, 1937. (522632.)

36594. "Manufacture of alkali metals by electrolysis." E. I. Du Pont De Nemours & Co., and R. E. Hulse. December 15th, 1938. (522635.)

36633. "Generators of electric waveforms." E. W. Bull. December 16th, 1938. (522637.)

36647. "Laminated electric insulators and insulating materials." Bushing Co., Ltd., and W. J. Brown. December 16th, 1938. (522553.)

36706. "Cores of high-frequency inductances, transformers and the like." Standard Telephones & Cables, Ltd. (W. J. Polydoroff). December 16th, 1938. (522641.)

36734. "Electric motors." G. A. Betulander. January 15th, 1938. (522557.)

36888. "Photo-electric exposure meters." Metrawatt Akt. Ges. Fabrik Elektrischer Messgerate. December 20th, 1937. (522656.)

36934. "Electrical resistances." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. December 18th, 1937. (522660.)

1939

4843. "Bearing structures for electric motors." M. W. Woods, T. R. Diggle and G. A. C. Whitfield. February 14th, 1939. (522668.)

5754. "Rotary magnets for magnetos." Magnetos Lucifer Soc. Anon. March 18th, 1938. (522621.)

7162. "Fans." M. W. Woods and B. B. Daly. March 4th, 1939. (522669.)

8554. "Electric reciprocating motor for warning signals and the like." A. H. Stevens (Sparks-Withington Co.). March 17th, 1939. (522508.)

10675. "Photo-electric exposure-meter." J. M. Bing. October 27th, 1938. (522623.)

12644. "Electric-discharge tubes." H. Williams and Maple & Co., Ltd. April 27th, 1939. (522510.)

14875. "Electric transformers." British Thomson-Houston Co., Ltd. May 20th, 1938. (522671.)

27539. "Electric motors." Standard Telephones & Cables, Ltd., B. B. Grace and C. P. Smith. October 10th, 1938. (Divided out of 522467, cognate application 27616/39.) (522511.)

1940

6046. "Variable capacity devices." Marconi's Wireless Telegraph Co., Ltd., N. M. Rust, J. D. Brailsford, A. L. Oliver and J. F. Ramsay. November 12th, 1938. (Divided out of 522476.) (522564.)

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from July 10th:—

The Five Rams Flashlight Unit Cell (lettering and design). No. 610623. Class 9 (IV). Electric batteries and accumulators.—Jong Sau Pun, trading as the Hing Wah Battery Factory, 3099, Mongkok Road, Kowloon, Hong Kong, China (British representatives: Dicker, Pollak, Mercer, Tench and Meyer, 20-23, Holborn, London, E.C.1).

Silver Star (lettering and design). No. 608678. Class 9 (IV). Batteries for electric torches.—H. R. and L. Dennis Bros., Ltd., 183, High Street, Shoreditch, E.1.

T.M.C., The Sign of Efficiency Transmission Systems (lettering and design). No. 611204. Class 9 (IV). Telephonic apparatus and systems and electrical communication apparatus and systems.—Telephone Manufacturing Co., Ltd., Hollingsworth Works, Martell Road, West Dulwich, S.E.21.

Thermac. No. 611573. Class 9 (IV). Electric arc welding apparatus.—Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, London, W.C.2.

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.

New Companies Registered

H. Cripps & Co., Ltd.—Private company. Registered July 8th. Capital, £3,000. Objects: To carry on the business of electrical engineers and contractors, wireless and general engineers, &c. Directors: H. Cripps and W. H. T. Cripps, both of 2, Axminster Road, N.7, and Miss L. R. Stone, 27, Brooklyn Avenue, West Worthing. Registered office: 41, Blandford Street, W.1.

Albert Mann's Engineering Co., Ltd.—Private company. Registered July 10th. Capital, £500. Objects: To carry on the business of electrical, mechanical and general engineers, aeronautical engineers, consultants and experts, &c. Permanent directors: A. Mann, 59, Hornchurch Road, Romford, and D. Mann, The Old Vicarage, Chase Hill Road, near Grimsby. Solicitor: Fdk. J. Gerrey, 6, Western Road, Romford.

Alumilite & Alzack, Ltd.—Private company. Registered July 3rd. Nominal capital £10,000. Objects: To carry on the business of metallurgists and electrical and general engineers and metal founders, &c. Subscribers: E. H. Wiseman, 8, Severn Avenue, Gidea Park, Romford, and C. E. G. Chapman, 13, St. Wilfrid's Close, East Barnet, Herts. Solicitors: J. D. Langton & Passmore, 8, Bolton Street, W.1.

Mitre Electrical & General Co., Ltd.—Private company. Registered July 11. Capital, £100. Objects: To carry on the business of electrical engineers and general contractors, dealers in and agents for all kinds of electrical and other supplies, &c. Directors: R. Mills, 13, Pentland Close, N.W.11, and A. Miller, 174, Oxford Road, Reading. Registered office: 414, Edgware Road, W.2.

Electrozone, Ltd.—Private company. Registered July 12th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in ozone, ozonators, etc. Subscribers: R. R. Bailey, 10, Dale Street, Liverpool, and S. H. Lunt, 6, Radley Road, Wallasey. Secretary: R. R. Bailey. Registered office: 10, Dale Street, Liverpool.

Hornsey Engineering & Electrical, Ltd.—Private company. Registered July 13th. Capital, £100. Objects: To carry on business as mechanical and general engineers and as manufacturers of and dealers in machinery, rolling stock, implements, tools, &c. Subscribers: H. Bloom, 12, Lytton Close, N.2, and R. Moss, 14, Rectory Road, E.12. Solicitors: Byre Cohen & Co., 1-3, St. Paul's Churchyard, E.C.4.

Thomas Taylor & Sons (Leicester), Ltd.—Private company. Registered July 12th. Capital, £2,000. Objects: To acquire the business of engineers carried on by F. W. Taylor and C. S. Taylor at Gladstone Street, Leicester, as "Thomas Taylor & Sons," and to carry on the business of electrical, wireless, mechanical, hydraulic, civil, motor and general engineers and engineering contractors, &c. Permanent directors: F. W. Taylor, 5, Marina Road, Leicester, and C. S. Taylor, 221, Scraptoft Lane, Leicester. Solicitors: Sprigge & Pollard, 4, Loseby Lane, Leicester.

Ryecroft Electric, Ltd.—Private company. Registered July 12th. Capital, £10,000. Objects: To carry on the business of electrical, general and mechanical engineers, manufacturers of machinery, tools, small tools and plant, &c. Subscribers: W. S. Shaw and B. V. Whittingham, 2, Bond Court, E.C.4. Registered office: Smith Street, Ashton-under-Lyne.

Companies' Returns

Statements of Capital

Switchit Service, Ltd.—Capital, £3,000 in £1 shares. Return dated December 14th, 1939 (filed May 18th, 1940). All shares taken up. £3,000 paid. Mortgages and charges, £300.

W. J. Furse & Co., Ltd.—Capital, £35,000 in 9,000 preference and 26,000 ordinary shares of £1. Return dated June 1st. 9,000 preference and 22,860 ordinary shares taken up. £12,566 paid on 12,566 ordinary shares. £19,294 considered as paid on 9,000 preference and 10,294 ordinary shares. Mortgages and charges, nil.

H. Horsley, Ltd.—Capital, £500 in £1 shares. Return dated April 29th. 421 shares taken up. £421 paid. Mortgages and charges, nil.

Windsor Electrical Installation Co., Ltd.—Capital, £150,000 in 65,000 ordinary, 50,000 5 per cent. preference, 25,000 7 per cent. preference and 10,000 unclassified shares, all of £1. Return dated March 5th, 1940. 65,000 ordinary, 23,532 5 per cent. preference and 25,000 7 per cent. preference shares taken up. £88,532 paid on 65,000 ordinary and 23,532 5 per cent. preference shares. £25,000 considered as paid on 25,000 7 per cent. preference shares. Mortgages and charges, nil.

Salisbury Electric Light & Supply Co., Ltd.—Capital, £125,000 in £1 shares. Return dated April 3, 1940. All shares taken up. £122,500 paid. £2,500 considered as paid. Mortgages and charges, £15,700.

British Arc Welding Co., Ltd.—Capital, £50,000 in £10 shares. Return dated April 10, 1940. 1,474 shares taken up. £12,740 paid. £2,000 considered as paid. Mortgages and charges, nil.

Mortgages and Charges

Leonard J. Ive, Ltd.—Mortgage on moneys due or to become due under a certain contract, dated June 14th, 1940, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Patrick Adie, Ltd.—Particulars filed of £2,000 debentures authorised May 31st, 1940, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £1,500.

Eddystone Components, Ltd.—Satisfaction in full on June 28th, 1940, of debenture dated June 30th, 1927, and registered July 7th, 1927, securing £1,000.

Electrical Research Developments, Ltd.—Mortgage debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated June 15th, 1940, to secure £350. Holder: S. R. B. Love, 15, Branscombe Gardens, Winchmore Hill, N.21.

Wild-Barfield Electric Furnaces, Ltd.—Charge on factory premises on Watford By-Pass, Bushey, dated June 28th, 1940, to secure all moneys due or to become due from the company to Westminster Bank, Ltd.

Increase of Capital

Aish & Co., Ltd.—The nominal capital has been increased by the addition of £2,500, beyond the registered capital of £10,000. The additional capital is divided into 2,500 cumulative redeemable preference shares of £1.

Company Liquidations

Frank Sword, Ltd., electrical contractors, 19, Withington Road, Manchester.—Pursuant to Section 238 of the Companies Act, 1929, a meeting of the creditors was held recently. The statement of affairs showed liabilities of £320 and total assets of £327, leaving a deficiency of £493 so far as the creditors were concerned. The issued capital of the company was £500, and as regarded the contributories there was a deficiency of £993. A resolution was passed confirming the voluntary liquidation of the company with Mr. A. T. Eaves, of Messrs. Harry L. Price & Co., as liquidator, with a committee of inspection.

Cox and Hembrow, Ltd.—Winding up voluntarily. Liquidator, Mr. N. W. Osborne, 11-12, Finsbury Square, London, E.C.2.

Ross & Robinson, Ltd.—Particulars of claims by July 30th to the liquidator, Mr. C. Latham, 185-188, High Holborn, London, W.C.1.

Bankruptcy Proceedings

F. J. Harrison, carrying on business under the style or name of C.W.H. Electrical Co., Dicconson Street, Wigan, electrician.—The public examination was held at the Court House, Crawford Street, Wigan, recently. The statement of affairs showed unsecured liabilities of £1,349, and net assets of £545, leaving a deficiency of £804. Debtor said that in 1926 he commenced trading in partnership with two others as electrical and wireless general engineers and dealers at Standishgate, Wigan. A dissolution took place in November, 1934, between debtor and one partner, the second partner having withdrawn previously, and debtor continued the business alone. In 1937 a fire occurred and debtor vacated the premises at Standishgate, transferring the business to Dicconson Street. He received £670 compensation for damage sustained in the fire, but after that time the business steadily declined. He had been sued by creditors and judgment had been obtained. The examination was closed.

R. H. Levy, electrician, 29, Roman Road, Linthorpe, Middlesbrough.—The public examination was held on July 5th at the Court House, Wilson Street West, Middlesbrough, when the statement of affairs disclosed gross liabilities of £6,084, of which £1,923 was expected to rank for dividend, with assets estimated at £1,374. The failure was attributed to losses arising from carrying on the business. The hearing was adjourned.

J. K. Thornborough, 7, Finlay Close, Kendal, Westmorland, and **E. C. Thornborough,** 17, Oak Street, Windermere, Westmorland, lately carrying on business at Crescent Road, Windermere, in co-partnership, under the style or firm name of J. K. Thornborough and Co., electricians.—The receiving order was made on the debtors' own petition, and at the first meeting of creditors held recently at the Official Receiver's Office, 16, Cornwallis Street, Barrow-in-Furness, the case being a summary one was left in the hands of the Official Receiver as trustee.

J. Stubbs and **J. A. P. Boulton** (John Stubbs & Co.), 39, Bootham, York (separate application of J. A. P. Boulton).—Application for discharge to be heard on September 24th, at the Law Courts, York.

S. J. Griffin, electrical engineer, 108, High Town Road, Luton.—Receiving order made July 10th on debtor's own petition.

W. T. Robinson and **H. Atterby** (J. P. Beckett & Co.), electrical engineers, 134, Victoria Street, Great Grimsby.—Supplemental dividend of 10d. in the £, payable July 16th at 8, Flottergate, Great Grimsby.

R. A. Young, electrical and mechanical engineer, Gullet Passage, Shrewsbury.—Last day for receiving proofs for dividend, July 27th. Trustee, Mr. F. C. Ormrod, 22, Swan Hill, Shrewsbury, Official Receiver.

Reports and Dividends

Telephone Rentals, Ltd., held their annual meeting on July 15th, when Mr. F. T. Jackson (chairman and managing director) said that in spite of difficult trade conditions due to the war all their British subsidiaries, with one exception, had traded at a profit. With regard to foreign subsidiaries, both of which operated in countries overrun by the enemy, they had been unable to obtain the final results for the past financial year, although they knew that they both traded at a profit and that a dividend would have been forthcoming from at least one of them. In the books of the company no value was ascribed to the holdings in these foreign subsidiaries. They had sold their interest in the Australian associated company and the

(*Continued on page* 61.)

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets lie once more under the shadow of an impending Budget. The Chancellor of the Exchequer has made it plain that the national revenue has to be materially increased, and, with this in mind, investment is chary of venturing upon the purchase of stocks and shares or, indeed, of any securities outside the various forms of national borrowing. The industrial markets have accordingly slipped back into a condition that approaches stagnation.

No little interest attaches to the declaration of the Home Railway dividends to be made on Friday in next week. Home Railway prior charge stocks show improvement; Southern 5 per cent. preference, for example, is 3½ points up at 72, but the junior stocks are dull, Southern preferred being 3 points lower at 44.

The difficulties of obtaining supplies of raw material are stressed at many company meetings now being held. At the Telephone Rentals meeting last Monday the chairman said that the company's progress is largely dependent on the ability to secure adequate supplies of equipment. His hint as to the wisdom of taking a cautious view of the position, in the matter of possible curtailment of activity, is being echoed in one way or another by a variety of companies.

Electricity Supply Shares

Few changes of consequence have taken place in the ordinary shares of the electricity supply companies. Business is very quiet. Apprehension of possible damage by air attack is the accepted reason for the reluctance of capital to take advantage of the unusually liberal yields offered by this group. Study of the final column of our price-list will show that the ordinary shares of established and front-rank electricity supply companies will provide yields ranging from 5 per cent. on the money. It is necessary to qualify this with a reference to the possibility of dividends being reduced for the current year, although no severe cuts are anticipated. The sensitive character of the market may be illustrated by a fall of 5s. this week in Midland Electric Corporation for Power Distribution ordinary. The price had been standing at 35s. A few sellers came in; there were no ready buyers, and shares changed hands down to 29s. 3d. North Eastern Electric ordinary have hardened to 20s. and Scottish Power to 26s. 3d. Notting Hill sixes are marked down 10s. to 9½.

Underground Stocks

The flow of public money into National War Bonds and other forms of war borrowing is praised by the Chancellor of the Exchequer, but is still not sufficiently rapid to satisfy the payment of a bill which is costing nearly £10 million per diem. Some of the principal monied institutions have had a plain hint, as already mentioned here, that their funds will be better employed in British Government stocks than in others to which, ordinarily, their capital might be directed. In this latter consideration, which for the most part is receiving every attention, lies the reason for the amount of stock which occasionally comes on offer without its finding an immediately ready response. Such trustee stocks as those of the London Passenger Transport Board can now be bought to give a running yield of £4 5s. to £4 17s. 6d. per cent., and the taking of redemption into account makes a difference of no more than 6d. or 1s. in the actual return. A small amount of Central London 4 per cent. guaranteed dissented stock, February and August dividends, is on offer at 70 to pay 5¾ per cent. ,and £1,000 Metropolitan assented stock, at 45, which at the present rate of dividend yields 7¼ per cent. Neither of these is eligible for trustee investment.

Debenture Stocks and Their Yields

London Power 3¼ per cent. redeemable debenture stock, on offer the other day in the market at 84, has been taken, but there is still £1,000 of County of London Electric 3¼ per cent. debenture which can be bought at 85. This pays £3 16s. 3d. as a flat return. The stock is redeemable at 100 in 1972, the company having the option to repay it at the same price after 1951. Allowing for repayment in 1972, the yield comes to £4 2s. 3d. per cent. Interest payments are due on the 1st June and December. In the last accounts, the interest was covered seven times over.

For a 4 per cent. running yield Northmet Power 4 per cent. debenture stock calls for notice at 99, the stock being liberally covered and repayable at 1976. The company can redeem the issue after 1943 at 102½. A small amount of Kent Electric Power 3½ per cent. debenture is in the market at 88, February and August interest. This pays £3 19s. 6d. per cent. Assuming redemption at 100 in 1975, the return works out to £4 3s. per cent. The annual amount required for the interest is £73,375. In the last published accounts there were earnings of £103,500 to meet it.

British Electric Traction

British Electric Traction 8 per cent. non-cumulative preferred stock is worthy of notice because of its recent heavy fall for no adequate reason. Stock changed hands lately at 135, as against what may be called a normal 160. At the former figure the yield is £5 18s. 6d. per cent. on the money. The Company holds a mixed bag of investments, must of them in sound and progressive undertakings. To pay the 8 per cent. dividend on the preferred stock takes £106,101 a year, and in the last published accounts the earnings showed £425,000 available to meet it. Dividends are due in June and December. The Company's deferred stock is unchanged at 500, around which price a few transactions are marked every business day. In a stock standing at anything like this figure, the difference between selling and buying prices is naturally considerable, but there is no valid reason why the Official List should quote a margin of no less than 100 points.

When Buyers are Absent

Declaration of a 20 per cent. dividend on Ward and Goldstone shares, repeating that of a year ago, has failed to bring about any rally from the sharp fall of three weeks ago, when from 19s. 6d. the shares gave way to 12s. 6d. No special reason could be assigned for the drop at that time: probably the official quotation of 19s. 6d. did not represent the marketable value. Consequently the appearance of a seller exercised what looked to be a disproportionate effect. At 12s. 6d., these 5s. shares pay 8 per cent. on the money. It is reasonable to assume that if any demand were to arise, the number of shares purchaseable at anything like 12s. 6d. would be found to be very small. The matter is of interest because its proper understanding will give the clue to many price-movements for which there is no obvious rhyme or reason.

A First Year's Results

Engineering and Lighting Equipment Company shares have been referred to here on several occasions since dealings began, in the £1 preference and the florin ordinary, in July last year. The company took over an old business bearing the same name. For the 7 per cent. redeemable preference, there was a mild rush. The price started off at 1s. premium; for the ordinary shares, the opening price was 2s. 1½d. The Company has just issued its first accounts which show, up to the end of last March, a net profit of £27,600. Out of this a dividend making 10 per cent. on the ordinary shares is declared. Eleven thousand of the 7 per cent. preference have been redeemed. The price of the ordinary is now 2s. ex dividend; the preference are quoted at 18s. 9d., the latter giving a yield of £7 9s. 4d. per cent., without making allowance for possible redemption.

Telephone and Telegraph

A further fall of three points in Anglo-American Telegraph preferred stock has reduced the quotation to 88½, and for the fall no other reason can be ascribed than the vague one of general conditions. A little stock came in and found the market tolerably well supplied. The effort to realise on the part of a few sellers has brought down the price 10 points within the past month. In the same market, Anglo Portuguese Telephones show this week a fall of 5s. to 11s. 3d. The company is paying a dividend of 8 per cent. on these £1 shares which, at the present price, give a yield of over 14 per cent. on the money. Political apprehensions are, of course, the reason for the weakness of the price. Shares changed hands to-day, Tuesday, at 10s.

Miscellaneous Matters

Amongst iron and steel shares Vickers, after their sharp recovery from 9s. 6d. to 13s. 3d., have reacted to 12s. 9d., but, taken as a whole, prices in the engineering group keep fairly steady. Deduction of the dividend of 4s., less tax, from General Electric ordinary has left the price at 66s. 3d. x.d., which shows a small net decline. The return at the present price is 6 per cent. on the money. The company's 6½ per cent. preference shares continue in favour and are 9d. up at 28s. 3d. A fall of 5s. in British Aluminium shares at 32s. 6d. is connected with the company's interests in France. A drop of half-a-crown in Chloride Electrical Storage shares followed a mild pressure to sell; Consolidated Signals have lost 6s. 3d. for the same reason. On the other hand, Murex are a better market at 65s. Electric and Musical Industries have strengthened to 5s. 9d.; Pye deferred shares remain flat at 7s. The report and accounts are overdue; it is thought that the dividend will be cut. Siemens 10 p.c. preference have fallen 2s. 6d. to 35s., and British Electric Transformer 5 p.c. preference are easier at 20s. As a pleasant exception to this dull recital, a rise of 3s. 3d., to 34s. 6d., in Associated Electrical Industries ordinary shares stands out with the more prominence, and Victoria Falls are also noteworthy with a gain of 2s. 6d. at 61s. 3d.

Forbidden to Deal

Owing to the ban placed by the British Treasury upon any dealings in certain foreign securities, the prices of these stocks have undergone no alteration since June 18th last, when the prohibition came into force. Half-a-score of the prices given weekly in our price-lists are included in the extensive catalogue which the Treasury order covers. They are:—

Stock or Share	Price June 17	Stock or Share	Price June 17
Montreal Power	32	Great Northern Tel. ...	12½
Shawinigan Power	20½	Int. Tel. & Tel.	3
Tokyo Electric 5 per cent....	52½	Brazil Traction	5½
American Tel. & Tel. ...	190	Mex. Light 1st Mort. ...	27½
Canadian Marconi	4/3	Rio 5 per cent. bonds ...	80

For the purposes of reference, valuations, probates, &c., it may be of service to retain the above prices in our lists for a few weeks. As there can be no change in the values, or business in the stocks—unless the Treasury should relax its veto—removal of the quotations will be effected in due course. Alternatively, the Treasury might elect to requisition some, or all of the stocks.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price July 16	Rise or Fall	Yield £ s. d. p.c.
Home Electricity Companies							
Bournemouth and Poole	63/6	42/6	15	15	42/6	...	7 1 2
British Power and Light	30/–	21/–	7	7	21/–	...	6 13 4
City of London	28/–	20/–	7½	7½	20/–	...	7 10 0
Clyde Valley	38/6	25/–	8	8	28/9	...	5 11 4
County of London	43/3	22/–	10½	10½	25/–	...	8 8 0
Edmundson's:							
7% Pref.	31/6	26/3	7	7	26/3	...	5 6 8
Ord.	27/6	18/6	9	6	20/6	...	5 17 1
Elec. Dis. Yorkshire	40/3	32/6	9	9	32/6	...	5 10 9
Elec. Fin. and Securities	41/3	38/6	12½	12½	38/9	...	6 9 0
Elec. Supply Corporation	46/3	38/6	12	11½	38/9	...	5 18 7
Isle of Thanet	16/–	5/6	4	4	6/–	...	13 6 8
Lancs Light and Power	33/–	25/–	7½	7½	25/–	...	6 0 0
Llanelly Elec.	21/–	17/6	5½	5½	18/–	...	6 2 2
Lond. Assoc. Electric	21/–	12/6	7	5½	13/3	...	—
London Electric	37/6	19/–	8	7	20/–	...	7 5 0
London Power Deb. Red.	105½	102	5	5	101½	...	4 18 6
Metropolitan	41/6	23/6	12	10	25/–	...	8 0 0
Midland Counties	39/–	24/3	8	8	26/3	...	6 2 0
Mid. Elec. Power	40/–	29/6	9	9	30/–	–5/–	6 0 0
Newcastle Elec.	29/9	24/6	7	7	24/6	...	5 14 3
North Eastern Electric:							
Ordinary	31/6	17/6	7	7	20/–	+6d.	7 0 0
7% Pref.	32/6	27/6	7	7	27/6	...	5 1 10
Northampton	48/–	40/–	10	10	40/–	...	5 0 0
Notting Hill 6% Pref. (£10)	10⅜	10	6	6	9½	–½	—
Northmet Power:							
Ordinary	42/3	23/–	10	10	25/–	...	8 0 0
6% Pref.	29/–	23/–	6	6	26/–	...	4 12 4
Richmond Elec.	24/6	18/–	7	6	20/–	...	6 2 0
Scottish Power	38/–	24/–	8	8	26/3	+6d.	6 4 3
Southern Areas	21/3	13/9	5	5	13/9	...	7 5 6
South London	23/3	20/–	7	7	20/–	...	7 0 0
West Devon	20/–	18/6	5	5	20/–	...	5 0 0
West Glos.	21/3	15/–	2½	4½	16/3	...	5 13 10
Yorkshire Elec.	40/–	24/6	8	8	27/6	...	5 16 5
Overseas Electricity Companies							
Atlas Elec.	4/–	1/3	Nil	Nil	1/6	...	—
Calcutta Elec.	37/–	22/6	10*	8*	25/6	...	6 8 0
Cawnpore Elec.	30/–	24/–	10	10	25/–	...	8 0 0
East African Power	25/6	21/–	7	7	21/3xd.	...	6 11 9
Jerusalem Elec.	24/–	18/–	7	7	20/–	...	7 0 0
Kalgoorlie (10/–)	12/6	9/6	7½	7½	11/6	...	6 10 5
Madras	26/9	25/–	8*	6*	25/–	...	4 16 0
Montreal Power	35½	30	1½	1½	32	...	—
Palestine Elec. "A"	25/–	17/–	5*	Nil	17/6	...	—
Perak Hydro-electric	20/3	13/6	6	2½	13/9	...	3 12 9
Shawinigan Power	27½	19	83cts.	90cts.	20⅛	...	—
Tokyo Elec. 6%	69	52	6	6	52½	...	11 8 6
Victoria Falls Power	75/9	56/–	15	15	61/3	+½	4 17 10
Whitehall Investments Pref.	17/9	8/–	7½	7½	9/–	...	16 13 4
Public Boards							
Central Electricity:							
1950–70	110½	104	5	5	104½	...	4 15 8
1955–75	112½	106	5	5	106½	...	4 14 0
1951–73	107½	102	4½	4½	102½	...	4 7 10
1963–93	96½	90	3½	3½	91½	...	3 16 6
London Elec. Trans Gtd.	92	87½	2½	2½	89	...	2 16 2
London & Home Counties							
1955–75	113½	105	4½	4½	105½	...	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	106	...	4 5 0
B	116	103	5	5	104½	...	4 15 8
C	65½	25	1½	...	30	...	—
West Midland Joint Elec.							
1948–68	106½	105	5	5	105½	...	4 14 9
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	190	...	4 14 9
Anglo-Am. Tel.:							
Pref.	106	87	6	6	88½	–3	6 15 7
Def.	23⅜	21	1½	1½	21½	...	6 19 6
Anglo-Portuguese	22/6	10/–	8	8	11/3	–5/–	14 4 6
Cable & Wireless:							
5½% Pref.	99⅜	70	4½	5½	75½	...	7 17 2
Ord.	65	28½	4	4	36	–1	11 2 2
Income	99⅜	93	...	...	96	...	4 3 4
Canadian Marconi $1	6/–	4/–	Nil	4cts.	4/3	...	—
Globe Tel. & Tel.:							
Ord.	32/6	23/–	7½*	6*	25/–	...	4 16 0
Pref.	22/9	22/6	6	6	23/9	...	5 1 1
Great Northern Tel. (£10)	20	11	20	20	12½	...	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	...	—
Marconi-Marine	30/–	18/6	10	7½	18/9	...	8 0 0
Oriental Telephone Ord.	2⅞	49/6	12*	11½*	2½	...	4 12 0
Telephone Props.	15/–	12/6	5	6	12/6	...	9 12 0
Telephone Rentals (5/–)	9/6	5/9	10	10	6/3	...	8 0 0
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	4/3	1/3	Nil	Nil	2/–	...	—
4% Inc.	11½	2	Nil	Nil	3½	...	—
British Electric Traction							
Def. Ord.	830	440	5	45	500	...	9 0 0
Pref. Ord.	169	134	8	8	140	–5/–	5 14 ⅓3
Bristol Trams	48/6	1⅞	10	8*	35/–	–1/8	—
Brazil Traction	12½	5½	$1	50c.	5½	...	—
Calcutta Trams	24/–	20/–	8	5½	20/–	...	5 10 0
Cape Elec. Trams	18/6	16/–	5	5	18/–	...	5 11 1
Lancs Transport	35/–	28/3	10	10	30/–	...	6 13 4
Mexican Light:							
1st Bonds	33	27	5	5	27½	...	—
Rio 5% Bonds	90	74	5	5	80	...	6 5 0
Southern Rly.:							
5% Prefd.	79	35	5	5	44	–3	11 7 4
5% Pref.	104½	60	5	5	72	–3½	6 19 0
T. Tilling	45/9	31/–	10	10	31/3	...	6 8 0
Tilling & B.A.	47/6	43/9	9*	8*	47/6	...	3 7 10
West Riding	35/–	27/6	10	10	30/–	...	6 13 4
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	15/–	15	15	17/6	...	—
Assoc. Elec.:							
Ord.	43/3	27/–	10	10	34/6	+3/3	5 16 0
Pref.	35/3	32/3	8	8	33/9	...	4 14 10
Automatic Telephone & El.	47/3	32/–	12½	12½	35/–	...	7 2 10
Babcock & Wilcox	50/–	28/6	10	11	32/6	...	6 15 4
British Aluminium Ord.	56/–	32/6	12½	12½	32/6	–5/–	7 13 10
British Insulated Ord.	92/6	67/–	20	20	72/6	+⅛	5 10 3
British Thermostat (5/–)	14/9	7/–	18½	18½	7/–	...	13 4 4
British Vacuum Cleaner(5/-)	12/6	8/–	40	12½	10/–	...	6 5 0
Brush Ord.	4/6	2/–	Nil	Nil	2/6	...	—
Callender's	69/–	46/–	15	15	50/–	+½	6 0 0
Chloride Elec. Storage	72/6	65/–	15	15	3	–⅛	4 16 0
Consolidated Signal	72/6	59/–	36½	17	65/–	...	5 4 7
Crabtree (10/–)	24/9	17/6	17½	17½	20/–	...	8 15 0
Crompton Parkinson:							
Ord. (5/–)	20/–	12/6	30	20	12/6	...	8 0 0
E. K. Cole (5/–)	5/–	2/6	10	Nil	2/9	...	—
Elec. & Musical Industries (10/–)	10/3	4/3	5	Nil	5/9	+6d.	—
Electric Construction	36/3	30/–	13½	10	30/–	...	6 13 4
Enfield Cable Ord.	56/–	40/6	25	16½	42/6	...	7 13 0
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	...	5 0 0
English Electric	33/9	16/6	10	10	21/3	...	9 8 2
Ensign Lamps (5/–)	15/3	13/9	25	25	13/9	...	9 1 10
Ericsson Tel. (5/–)	39/3	25/–	25*	25*	25/–	–½	5 0 0
Ever Ready (5/–)	28/3	17/3	30	40	20/6	...	9 15 2
Falk Stadelmann	18/3	12/6	10	6	12/6	–½	9 12 0
Ferranti Pref.	25/–	23/–	7	7	25/–	...	5 12 0
G.E.C.:							
Pref.	32/6	27/–	6½	6½	28/3	+9d.	4 12 6
Ord.	83/3	56/–	20	20	66/3xd	–⅛	6 0 10
Greenwood & Batley	25/6	20/–	15	13	20/–	...	6 10 0
Hall Telephone (10/–)	18/6	15/–	15	10	11/3	–⅜	—
Henley's (5/–)	21/6	13/6	20	20	15/–	...	6 13 4
4½% Pref.	21/3	20/6	4½	4½	21/3	...	4 4 8
Hopkinsons	46/9	35/–	12½	15	33/9	–⅛	8 17 10
India-Rubber Pref.	21/–	20/–	5½	5½	20/9	...	5 6 0
Intl. Combustion	121/3	75/–	32½	32½	4	...	8 2 6
J. Lucas	60/6	40/–	15	15	42/6	...	7 1 2
Johnson & Phillips	50/9	33/–	12½	15	33/9	...	8 18 0
Lancashire Dynamo	59/9	47/6	25	20	47/6	...	8 8 5
Laurence Scott (5/–)	11/–	7/–	15	15	8/–	...	9 7 6
London Elec. Wire	25/6	24/6	12	7½	25/–	...	6 0 0
Mather & Platt	46/6	30/–	13½	10	31/–	–1/–	6 9 1
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	...	5 3 6
Murex	86/9	52/6	20	20	65/–	–⅛	6 3 9
Pye Deferred (5/–)	9/–	6/9	25	25	7/–	...	14 0 8
Revo (10/–)	20/9	12/6	17½	5	12/6	...	8 0 0
Reyrolle	60/6	41/–	12½	12½	41/–	–⅛	5 17 8
Siemens Ord.	23/9	16/3	7½	7½	16/3	...	9 4 8
Strand Elec. (5/–)	2/3	9d.	10	4	1/3	...	10 0 0
S. Smith (1/–)	8/–	3/6	37½	50	3/9	...	13 6 8
Switchgear & Cowans (5/–)	11/9	7/6	20	10	6/3	–⅛	8 10 0
Telegraph Condenser (10/–)	8/9	6/3	5	—	8/9	...	—
Telegraph Construction	42/6	32/6	10	10	32/6xd	+9d.	6 3 1
Telephone Mfg. (5/–)	9/–	5/–	9	9	5/6	...	8 3 8
Tube Investments	96/9	61/3	23¾	23¾	71/3	–⅛	6 14 0
Vactric (5/–)	3/6	2/–	4	Nil	2/6	...	—
Vickers (10/–)	22/–	9/6	10	10	12/9	–9d.	7 17 0
Ward & Goldstone (5/–)	19/9	12/6	20	20	12/6	...	8 0 0
Westinghouse Brake	46/–	32/9	17½	10	35/–	...	5 14 3
Walsall Conduits (4/–)	26/6	17/6	55	55	21/3	...	10 7 0
West, Allen (5/–)	7/–	4/–	10	7½	5/–	...	7 10 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, S.W.1.

Australia. — BRISBANE. — August 13th. City Electric Light Co. Two outdoor oil-immersed automatic step voltage regulators. (T. 19607/40.)*

SYDNEY.—October 24th. County Council. One 50,000-kW steam turbo-alternator set for the Bunnerong power station. (T. 16057/40.)*

Barnoldswick.—July 31st. Electricity Department. 6.6-kV switchboard and two 500-kVA transformers. (July 12th.)

Belfast.—August 5th. Electricity Department. Rubber-covered conveyor belting and l.v. high-rupturing-capacity switchgear. (See this issue.)

Dundee. — July 23rd. Corporation. Electric vegetable chopper, kitchen plant, &c., at Ashludie Sanatorium. City quantity surveyor, 21, City Square.

Gloucester.—August 29th. Corporation. Electrical installation at new maternity hospital. (See this issue.)

South Africa. — JOHANNESBURG. — City Council. August 14th. 500 20-A, 2,000-V outdoor type isolating links. (T.20650/40.)*

August 1st. Union Tender and Supplies Board. One bank of nine low-voltage switches of the metal-clad, pedestal mounted, draw-out, triple pole, oil-break type. (T. 20655/40.)*

PRETORIA.—Union Tender and Supplies Board. August 8th. One bank of six l.v. switches of the air-insulated type for operation on a 380-220-V, three-phase, four-wire, 50-cycle system. (T. 20775/40.)*

August 1st. Public Works Department. Electrical apparatus comprising ceiling, desk and wall fans, kettles, radiators, reflectors and urns. (T. 20778/40.)*

August 8th. Two cold rooms in the Mental Hospital, the units to be of the air-cooled condenser type having capacities of 4,000 and 3,500 B.Th.U. per hour respectively. (T. 20774/40.)*

July 30th. City Council. Ten electric trolley-bus chassis, with double-deck bodies of the all-metal type, capable of seating sixty passengers, for the Bus Garage, Boom Street. Department of Overseas Trade (Room 75, 1st Floor).

August 14th. Fluorescent tube lighting equipment for the Grand Hall of the City Hall. (T. 20647/40.)*

CAPE TOWN.—September 5th. Electricity Department. Thirty-two 6-ft., eight 4-ft. and 56 2-ft. double-tier heaters for the wards of the Infectious Diseases Hospital. (T. 20785/40.)*

Orders Placed

Bath.—City Improvements Committee. Accepted. Electrical installation in Norfolk Crescent flats (£34).—H. L. Bush & Co.

Blackpool. — Electricity Committee. Accepted. Retubing condenser.—Yorkshire Copper Works.

Highways Committee. Accepted. Street lighting equipment.—Ferranti; Revo Electric Co.; British Thomson-Houston Co.; Edison Swan Electric Co.; General Electric Co.

Bradford. — Watch Committee. Accepted. Maintenance of traffic signals (£113 per annum for five years).—Siemens & General Electric Railway Signal Co.

Electricity Committee. Recommended. Remote manual control for forced-draught and induced-draught fans and instrument and control panel for No. 8 boiler.—J. Gordon & Co. Wiring, &c., to various items of No. 8 boiler equipment. —J. Tate & Co. Surge tank and water storage tank.—Newton Chambers & Co.

London.—FINSBURY.—Borough Council. Accepted. Automatic telephone installation at the Town Hall, &c. (£1,137).—Reliance Telephone Co.

Middlesbrough.—Town Council. Accepted. Electrical installations in air-raid shelters (£108).—H. G. Sproates.

Paisley.—Watching Committee. Recommended. Switchboard, &c., at the fire station (£105).—Associated Fire Alarms.

Southport.—Electricity Committee. Accepted. Portable coal conveyor (£143).—Herbert Morris.

Tunbridge Wells.—Lighting Committee. Accepted. Switchgear (£1,912).—B.T.H. Cable extension (£6,297).—Standard Telephones.

Walsall.—Electricity Committee. Accepted. Nine 400-kVA transformers (£286 each) and one 500-kVA (£341).—Brush Electrical Engineering Co.

West Ham.—We regret that the notice which appeared under this heading in our last issue was incorrect, the contracts referred to related to plant which is being installed by Wolverhampton Corporation.

Workington. — Electricity Committee. Accepted. Change of voltage from 3.3 to 11 kV: 11-kV cables from Annie Pit substation to Northside.—B.I. Cables. Protective tiles.—J. H. Baldwin & Co. Switchgear for Drybread site (£1,273), Stanley Street substation (£1,681), Thermal Syndicate (£1,252), and clothing factory (£1,231), and temporary switchgear for Annie Pit substation (£120).—Met.-Vick. Elecl. Co.

(Continued on next page)

Financial Section (*Concluded from page 58*)

Reports and Dividends—contd.

financial result of this transaction was satisfactory.

With regard to the future, progress was largely dependent on the continuance of adequate supplies of apparatus, but he had every expectation that they would be able to ensure supplies of a considerable part of the apparatus they used.

The Electric Construction Co., Ltd., held its annual meeting on July 11th, when Mr. J. Gray (chairman and managing director) said that the volume of orders exceeded any previous record of the company. The reason why the net profit was less was that very soon after war was declared their whole energies and much of their capacity had to be devoted to war work. At the close of the financial year several large contracts were not due for delivery, and formed part of "work in progress" which contributed a provision towards the factory charges, but no overhead charges or profits, pending completion. The change-over to war work interrupted the execution of ordinary profitable business, with the result that the turnover for the year was reduced, and consequently also the profit.

The East African Power & Lighting Co., Ltd.—Presiding at the annual meeting held on July 15th Major H. F. Ward (chairman) said that the results in the East African territories were largely affected by commodity prices which had been well maintained. The past year had also shown considerable increase in the development of secondary industries. The rainfall in the Nairobi area during 1939 proved to be the lowest on record in the history of the East African territories, and the company had extreme difficulty in meeting the demands of its consumers. The new 1,400-BHP Diesel generating set ordered early in the year was delayed in shipment by the war and did not arrive in the country to take part of the load until April, 1940. Sales of electricity in Kenya showed an increase of 17.35 per cent., while the undertaking in Uganda continued to progress satisfactorily. In Dar-es-Salaam additional plant capacity had been installed to meet requirements, while in the Tanga area results suffered earlier in the year but were more encouraging towards the end.

The Palestine Electric Corporation, Ltd.—At the annual meeting held on July 11th Viscount Samuel (chairman) said that despite the disturbed conditions which continued in Palestine for several months last year, and the state of war which existed since last September, the business of the Corporation continued to develop. The first four months of the current year had shown an increase of consumption. Information had, however, been received that, owing to the introduction of black-out regulations, the revenue from domestic lighting was being greatly reduced, while street lighting, the revenue from which in 1939 amounted to over £P.15,000, had been completely discontinued.

Franco Signs, Ltd., reports that the net profits of the operating subsidiaries for the year to March 31st were £19,011, as compared with £33,480 for the preceding year. Provision has been made out of accumulated profits for war contingencies (£30,000) and cost of acquisition of E.S.S. Signs, including loss incurred during regorganisation (£5,299). It is proposed to pay a final dividend on the ordinary shares of 4 per cent., less tax, making 5 per cent. for the year (against 10 per cent.).

The Engineering & Lighting Equipment Co., Ltd., reports a trading profit of £54,521 for the year ended March 31st, as compared with £59,254 for 1938-39. Directors' fees amount to £425, income tax £8,000 and E.P.T. £18,500, leaving a net profit of £27,596. Out of this £11,579 has been applied in redeeming 11,020 of the 7 per cent. cumulative redeemable preference £1 shares, and £559 has been written off the premium and costs. The final ordinary dividend is 4 per cent., making 10 per cent., less tax, for the year, and £2,293 is carried forward.

Taylor, Tunnicliff (Electrical Industries), Ltd., have announced a final dividend of 10 per cent., making 12½ per cent. for the thirteen months ended December 31st. At the annual meeting on May 30th the directors stated that it was not then possible to say what the dividend would be owing to the position of the company and its liability to E.P.T. not having been settled. Last month an ordinary interim of 2½ per cent. was declared on account of 1940.

Bennis Combustion, Ltd., report net profits for the year to April 30th of £29,371, as compared with £25,968 for 1938-39. The final ordinary dividend is 5 per cent., again making 10 per cent. for the year, less tax.

Ward & Goldstone, Ltd., are paying a final dividend of 10 per cent., making 20 per cent. for the year. In the previous year the final dividend was 15 per cent., making 20 per cent., plus a scrip bonus of 10 per cent.

The Electric Furnace Co., Ltd., has announced a final dividend of 3½ per cent., making 7 per cent. for the year (unchanged).

The Rheostatic Co., Ltd., announces that, although the profit for the half-year would have permitted payment of an interim dividend, it is considered prudent to wait until the year's accounts to September 30th are available.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Cardiganshire. — School, Cwm-Pysgotwr, near Llanddewi Brefi; R. Jones, county architect, County Hall, Aberayron.

Carlisle. — Shelters at Caldewgate School, for the E.C.; P. Dalton, city engineer, 18, Fisher Street, Carlisle.

Chanctonbury. — Pumping station for R.D.C.; surveyor, Council Offices.

Chester.—Church in Circular Drive, Lache; Rev. J. Phillips, Lache-cum-Saltney.

Chester-le-Street.—Three public shelters at Lumley, for the R.D.C.; surveyor.

Cornwall.—School shelters (£3,000); county architect, County Hall, Truro.

Coventry.—Flats and garages, Grosvenor Road, for Greyfriars Estates, Ltd.; Rolf Hellberg, architect, 13, Queen Victoria Road, Coventry.

Houses, Forfield Road, for Wonder Houses, Ltd.; H. Whiteman & Son, architects, 4, Queen Victoria Road, Coventry.

Houses at Willenhall and Whoberley Hall; D. E. E. Gibson, city architect, 1a, Warwick Row, Coventry.

Foundry extensions; British Piston Ring Co., Ltd.

Works extensions; Courtaulds, Ltd.

Pumping station building, Green Lane; F. Smith, town clerk, The Council House.

Crayford.—Domestic shelters (200), for U.D.C.; surveyor, Municipal Buildings.

Derby. — Communal shelters (12); borough architect.

Durham.—Shelter at Consett school; F. Willey, 24, Old Elvet, Durham.

Eire.—SOUTH CORK.—Houses (52), Bandon, for Board of Public Health; B. O'Flynn, 60, South Mall, Cork.

Felling-on-Tyne. — Shelters, Felling Council School and St. John's R.C. Junior School; U.D.C. surveyor.

Glasgow.—Additions to works, for Melvin & Gillespie, Ltd.; Cowieson, Ltd.

Extensions, for Mavor & Coulson, Ltd.; Geo. A. Boswell, architect, 256, West George Street.

Alterations to premises, for Glass Fibres, Ltd.; Wm. Ross, architect, 189, Pitt Street.

Grantham.—Houses (225), Dysart Road; borough engineer.

Guildford.—Factory extensions; Skelton & Son.

Offices and factory additions, Stoke Road; R. F. D. Co., Ltd.

Factory; Whitehouse Precision Tool Co., Ltd.

Hastings.—School shelters (£2,643); borough engineer.

Horbury.—Houses in Oakwood Grove, for H. Smith & Son, Northfield Lane, Horbury, near Wakefield.

Huddersfield. — Ward block, &c. (£2,900), Crippled Children's Home, Lindley Moor; borough engineer.

Jarrow-on-Tyne. — Cleansing station; D. Glen, Back Queen's Road, Jarrow, is contractor.

Kidsgrove.—Surface type shelters at Liverpool Road, Goldenhill Bank, and High Street, Harriseahead, for U.D.C.; H. W. Crowther-Green, surveyor, Town Hall.

Lincolnshire.—School shelters in Boston rural area, for E.C.; county architect, County Hall, Boston.

Lytham St. Annes.—Public shelters (30 to 40 persons each), and fire station; borough engineer, Town Hall, Lytham.

Manchester.—Flats, Thornton Street. Gay Street and Collyhurst Street, for the Housing Committee; W. M. Hughes, housing director, Town Hall.

Houses (6), Romney Street and Hinde Street, Moston, for G. Halsall; A. McDonald, architect, 70, Newport Road, Chorlton-cum-Hardy.

Rebuilding "Three Tuns" Hotel, Collyhurst, for Threlfalls Brewery Co., Ltd., Cook Street, Salford; B. Waterhouse, architect, 134, Deansgate.

Additions to works, Linn Street, Crumpsall, for A. Hogg, Ltd., Linn Street; Roberts, Wood and Elder, architects, 26, King Street.

Office and laboratory for Imperial Chemical Industries, Ltd.

Chapel, Hulme Hall, Oxford Place, Rusholme; Rev. A. T. White, Oxford Place, Rusholme.

Additions to premises, 57, Shakespeare Street, Everton Road and Hyde Grove, Chorlton-upon-Medlock, for W. Mills & Sons, Ltd., 57, Shakespeare Street; F. Lyons & Sons, Ltd., contractors, 57/59, Shakespeare Street.

Matlock.—Methodist Sunday school, Darley Dale; A. Eaton & Son, architects, 6, The Strand, Derby.

Shelters (£2,040), for U.D.C.; Surveyor's Office, Town Hall.

Middlesbrough.—Communal shelters for the Town Council. Contractors: J. McCreton & Son; Stephen Coates, Ltd.; Hudson Brothers; W. H. Causier; W. A. King & Son; N. Thompson, Ltd.; W. E. Price; and W. and A. Warne (all of Middlesbrough).

Cleansing station; W. F. Richardson, builder, Ormesby, Middlesbrough.

Morley.—Rebuilding Fleece Inn, Troy Road; Truman, Hanbury, Buxton & Co.

Workshop, Marshall Street; J. D. Asquith & Son, Ltd.

Neath.—Fire station and fire station extension, for R.D.C.; J. T. Jones, engineer, 13, Orchard Street, Neath.

Newcastle-under-Lyme. — Decontamination centre and laundry; Hollins and Jones, architects, Lloyds Bank Chambers.

Day nursery for the Maternity and Child Welfare Committee; Sheppard and Shufflebotham, architects, 38, Bedford Place, London, W.C.1.

Newcastle-on-Tyne.—Air-raid shelter at Star Buildings; J. Oswald & Sons, architects, Bradburn Chambers, Northumberland Street, Newcastle. Shelter, St. Lawrence Road, for J. Lowrie & Co.; J. N. Fatkin, architect, Grainger Street, Newcastle.

Conversion of 43, Lesbury Road into flats for W. Blacklock.

Store and additions to offices, Walker Road, for Messrs. G. Angus & Co.; Hetherington and Wilson, architects, County Chambers, Westgate Road, Newcastle.

Northumberland.—Further shelters at Belford Council School; county architect, County Offices, Morpeth.

Oswestry.—Firemen's houses; J. E. Taylor, borough surveyor, Guildhall.

Redcar (YORKS).—Cleansing station; J. Locking, surveyor, Council Offices, Redcar.

Rotherham. — Extension to office, Holmes Mills, for J. J. Habershon & Sons, Ltd.

First aid, &c., depôt, and decontamination laundry at Badsley Moor Lane Hospital, borough engineer.

Saltcoats.—Air-raid shelters for Town Council; burgh surveyor.

Southgate.—Factory alterations, Green Lanes; Swanser & Son, Ltd.

South Shields. — Further communal shelters (£4,000); A. G. Richardson, acting borough engineer.

Staffordshire.—Council school on the Pheasey estate, Great Barr; G. C. Lowbridge, county education architect, County Offices, Stafford.

Stockton-on-Tees. — Additions to the Grand Hotel, Cross Street, for North-Eastern Breweries; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Stoke-on-Trent.—Warehouse for Wiltshaw & Robinson, Ltd., Carlton Works, Copeland Street; Sambrook Bros., Ltd., contractors; Hamil Road, Burslem, Stoke-on-Trent.

Stretford.—Extension of office accommodation at the Town Hall, together with an additional electric lift; Bradshaw, Gass and Hope, architects, 19, Silverwell Street, Bolton.

Sunderland. — Rebuilding Commercial Hotel, Green Street; manager.

Todmorden.—Additions to mills, Portsmouth, Todmorden, for D. Mallinson & Sons, Ltd., Cornholme, Todmorden; H. C. Halsted & Sons, Ltd., contractors, Prescott Street, Burnley.

Torquay. — Shelters in shopping centres; borough engineer, Town Hall.

Warwickshire.—Additional classrooms and assembly hall as extensions at the junior and infants' school, Hillmorton Paddox; A. C. Bunch, county architect, Shire Hall, Warwick.

West Hartlepool. — School shelters. Contractors: W. W. Brazell, Ltd.; T. M. Stonehouse, Ltd.; John Proud, Ltd.; W. Pearson and Son; and C. M. Yuill (all of West Hartlepool).

Widdrington (NORTHUMBERLAND). — Completion of 160 houses; R. Carse and Sons, builders, Morpeth, Northumberland.

Economy in Meter Reading

Swinton and Pendlebury Engineer's Suggestion

IN view of the Government's desire that employers should release as many persons as possible for the war effort and economise in the use of materials, Mr. H. C. Busbridge, electrical engineer to the Swinton and Pendlebury Corporation, puts forward the suggestion of extending meter reading periods from three to six months and sending two accounts to each consumer in the same envelope, the first based upon actual past consumption to that date, and the second being an estimated account for the ensuing three months. It is recommended that the interim quarterly account should be marked, "Payable at three months from this date and subject to a final adjustment upon taking of the half-yearly meter readings."

Assuming an average of 80 readings per meter reader per day and that the net number of working days is 275 per annum, in the case of an undertaking with 100,000 consumers the annual saving would appear to be as follows: Release of nine meter readers at £182 per annum, £1,638; estimated saving in cost of invoicing, addressing, ledger posting, &c., £2,000; estimated saving in cost of stationery, printing, &c., £500; and saving in postage, £833; a total of £4,971.

Other possible variations of this scheme for reducing administrative costs by increasing the interval of meter reading periods might be considered, including a regular four-monthly meter reading period, or the taking of meter readings at the end of the two winter quarters only. This would ensure that accounts would be rendered upon actual consumption for the two normally heavy winter quarters, and possibly one estimated account might suffice for the six summer months.

The scope of application of the scheme would naturally be limited to the predominant smaller class of consumer, and it is obviously not intended that the proposal should apply to those large consumers whose accounts are usually rendered on a monthly basis. It is recognised that there may be certain objections to the foregoing proposals, among which, no doubt, is the increased risk of losing track of those consumers who disappear without giving notice, but it is considered that the savings would be considerably in excess of losses.

Lithuanian Electrification Plan

LAST April the Cabinet decided to draw up a general plan of electrification for the country and to supervise its fulfilment. It was agreed to take this step because it would be difficult, and even impossible, for private concerns to raise the capital necessary for the carrying out of a sufficiently extensive plan.

The Government will build large power stations and operate them either itself or through organisations formed for the purpose, or transfer them to the local municipalities. Other plant will be built by the municipalities and private persons or organisations, but must be erected in accordance with a fixed electrification plan. Moreover, both the municipalities and private persons and organisations may invest their capital and labour in the electrification organisations formed by the State Treasury.

The distribution of power in towns and hamlets will be carried out by the municipalities, unless they themselves should decide otherwise. An increase in the share capital of the Elektra company is proposed for the organisation of preliminary work and its issued bonds would be guaranteed by the State Treasury.—*Reuter's Trade Service.*